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FEDERATED MALAY STATES.

ANNUAL REPORT

OF THE

MEDICAL DEPARTMENT

FOR THE YEAR

1928

BY

DR. CHRISTOPHER J. WILSON,
Principal Medical Officer, F.M.S.

KUALA LUMPUR:
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FEDERATED MALAY STATES.

ANNUAL REPORT OF THE MEDICAL DEPARTMENT FOR THE YEAR ENDING 31st DECEMBER, 1928.

INTRODUCTION.

This annual report is concerned with a period previous to the date on which I assumed duty as Principal Medical Officer. It follows closely the lines on which previous annual reports have been compiled, that is to say, the general work of the department is summarized in the usual tables of statistics, with only very brief comment on a few points of outstanding interest, while certain special activities are described in full, in numerous appendices to the report, by the officers concerned with those branches of work. This method of presenting the report has the disadvantage of making it unnecessarily voluminous, while distorting the proper proportions of a general review. It is right that the work of the Health Branch, and of the Institute for Medical Research, should be set out as separate sections of the General Report: but other work, heretofore and presently described separately, might well be summarized in the body of the report.

ADMINISTRATION.

STAFF.

1. The total authorized staff of the Medical Department, Federated Malay States, including all branches, on the 31st December, 1928, was 1,218, and the distribution was as follows:

Hospital Branch	962
Health Branch	113
Institute for Medical Research	46
Central Mental Hospital	37
Veterinary Branch	34
Radiological Branch	12
Venereal Disease Branch	14
	1,218

2. The following were the principal changes which took place during the year:

Dr. C. J. Wilson, Deputy Director of Medical Service, Kenya, was appointed as Principal Medical Officer, Federated Malay States, on 20th December, 1928, and assumed duty on 21st January, 1929.

Dr. A. R. Wellington, Chief Health Officer, acted as Principal Medical Officer from 24th June, 1928, until 20th January, 1929. He was appointed Director of Medical and Sanitary Services, Hong Kong, on 4th February, 1929.

Dr. H. G. Holdbrook was appointed Senior Medical Officer, Selangor, with effect from 2nd February, 1927.

Dr. W. H. Hart was appointed Senior Medical Officer, Perak, with effect from 25th November, 1927.

Dr. H. R. Dive was appointed Senior Medical Officer, Pahang, with effect from 25th November, 1927.

Dr. (Miss) C. B. Kibble, Lady Medical Officer, was seconded for service in Kedah on 14th March, vice Dr. (Mrs.) K. M. Isaac seconded to Federated Malay States.

Dr. H. R. Dive, Senior Medical Officer, Pahang, acted as Senior Medical Officer, Selangor, from 16th November until the end of the year, during the absence on leave of Dr. H. G. Holdbrook.

Dr. W. Young, Medical Officer, acted as Senior Medical Officer, Pahang, from 16th November until the end of the year.

Dr. C. E. Cobb, who acted as Senior Medical Officer, Negri Sembilan, since last year, was transferred to Perak, on the return of Dr. D. T. Skeen. He acted as Senior Medical Officer from 15th March until 28th June, when he proceeded on long leave.

Dr. J. P. Fitzpatrick, Medical Officer, acted as Senior Medical Officer, Perak, from 29th June until the return from leave of Dr. W. H. Hart on 1st November.

Dr. C. S. Wilson, Medical Officer, acted as Chief Surgeon, Negri Sembilan, on the retirement of Dr. C. B. Pasley, from 1st May until the end of the year.

Dr. E. R. C. Cooke, Health Officer, acted as Specialist, Venereal Diseases, on the retirement on pension of Dr. E. A. Smith from 1st June until the end of the year.

Dr. F. G. Greenwood, Radiologist II, acted as Radiologist from 4th May until the end of the year, during the absence on leave of Dr. C. F. Constant.

Dr. J. J. O'Grady, Medical Officer, acted as Radiologist II from 1st May until the end of the year.

Dr. G. V. Allen, Bacteriologist, Institute for Medical Research, acted as Director, Institute for Medical Research, from 13th April until the end of the year, during the absence on leave of Dr. A. N. Kingsbury.

Dr. R. Lewthwaite, Research Student in Tropical Medicine, acted as Pathologist I from 15th March until the arrival of Dr. P. H. Martin on 26th October.

Dr. R. T. B. Green, Pathologist II, acted as Malaria Research Officer I, from 15th March until the end of the year.

Dr. C. R. Amies, Medical Officer, attached to the Institute for Medical Research, took charge of the Federal Leper Settlement on 1st July.

APPOINTMENTS.

During the year, the following officers were appointed:

Dr. J. W. Murdoch as Assistant Medical Superintendent, Central Mental Hospital, on 12th January.

Dr. (Miss) V. E. K. Stuart as Lady Medical Officer on 15th January.

Mrs. E. B. Johnston as Temporary Lady Assistant to Radiologist and Electrical Masseuse on 23rd January.

Dr. (Miss) E. A. Robertson as Lady Medical Inspector of Schools on 8th March.

Dr. G. A. Ryrie as Medical Officer on 8th March.

Dr. H. N. Walker as Medical Officer on 8th March.

Dr. A. Bearblock as Medical Officer on 8th March.

Dr. E. B. Jones as Medical Officer on 8th March.

Dr. J. C. P. Grey as Medical Officer on 8th March.

Dr. C. R. Amies as Medical Officer on 8th March.

Dr. T. P. Keating as Medical Officer on 23rd March.

Dr. E. S. Lawrie as Medical Officer on 23rd March.

Dr. A. Dunlop as Medical Officer on 23rd March.

Mr. A. H. Millard as Pharmaceutical Chemist on 28th April.

Mr. A. V. Hitch as Pharmaceutical Chemist on 15th June.

Dr. (Mrs.) C. V. Burne as Temporary Lady Medical Officer on 14th May.

Dr. N. V. McKenna as Medical Officer on 13th July.

Dr. E. G. Morris as Medical Officer on 10th August.

Mr. A. P. Chandler as European Male Attendant, Central Mental Hospital, on 10th August.

Miss A. O'Sullivan as European Female Attendant, Central Mental Hospital, on 14th September.

Miss M. T. Lamb as European Female Attendant, Central Mental Hospital, on 14th September.

Mr. C. H. Hewat as Temporary Steward Quarantine Camp, Port Swettenham on 13th August.

Dr. P. H. Martin as Pathologist I, on 28th September.

Dr. (Miss) M. C. Cairney as Lady Medical Officer on 7th September.

Retirements.

Dr. C. B. Pasley, Chief Surgeon, Negri Sembilan, retired on pension on 1st August, after three months' full-pay leave.

Dr. E. A. Smith, Specialist, Venereal Diseases, retired on pension on 1st September, after three months' full-pay leave.

Resignations and Dismissals.

Dr. A. Reid, Medical Officer, was dismissed from the service on 20th April.

Dr. C. C. Taffs, Medical Officer, resigned on 31st January.

Dr. F. L. Patterson, Medical Officer, resigned on 28th March.

Dr. (Mrs.) M. E. Hopkins, Temporary Lady Medical Officer, resigned on 30th June.

Transfers.

Mr. H. Marsden, Chemist, Institute for Medical Research, was transferred to the Customs Department on 16th August.

Deaths.

I have to record with deep regret the death of Dr. R. Dowden, Principal Medical Officer, on the 23rd June. I also regret to record the death of Dr. R. J. Colbert, Medical Officer, on the 30th January.

ASSISTANT SURGEONS.

Appointments.

3. The following Assistant Surgeons were appointed during 1928:

Mr. V. J. Seevaratnam, Assistant Surgeon, on 4th April.

Mr. S. R. Savoor, Assistant Surgeon, on 3rd August.

Mr. E. F. P. Noronha, Assistant Surgeon, on 28th August.

Mr. B. L. Silveira, Assistant Surgeon, on 28th September.

Mr. Peng Leong San, Assistant Surgeon, on 1st October.

Transfers.

Miss L. H. Ponnampalam now (Mrs. L. H. Dorai), Assistant Medical Officer, was permanently transferred to the Service of Johore Government on 1st January.

Retirement.

S. Cassim, Assistant Medical Officer, retired on 2nd April.

Resignations.

Mr. G. H. Oorloff resigned on 6th March.

Mr. Khoo Peng Seng resigned on 14th February.

Death.

Mr. V. Subramaniam, Deputy Medical Officer, died on 9th February, while on leave in Jaffna.

NURSING SISTERS.

4.

Appointments.

Miss E. E. Castle, Nursing Sister, on 4th January.

Miss E. Mercer, Nursing Sister, on 8th March.

Miss F. Mackinnon, Nursing Sister, on 31st May.

Mrs. M. Colbert, Nursing Sister, on 13th July.

Miss A. C. Pender, Nursing Sister, on 14th September.

Miss D. M. Cowan, Nursing Sister, on 20th September.

Miss C. M. Savill, Nursing Sister, on 5th October.

Miss C. A. Mathews, Nursing Sister, on 19th October.

Miss F. Holgate, Nursing Sister, on 15th November.

Miss P. M. Colledge, Nursing Sister, on 30th November.

Miss R. I. Potter, Nursing Sister, on 30th November.

PROMOTION.

Miss A. M. Johnson, Matron Grade II, promoted to Matron Grade I, on 1st January.
Miss M. E. Fisher, Matron Grade II, promoted to Matron Grade I, on 1st January.
Miss E. M. Couling, Nursing Sister, promoted to Matron Grade II, on 1st January.
Miss E. J. Risdon, Nursing Sister, promoted to Matron Grade II, on 1st January.
Miss G. E. Wright, Nursing Sister, promoted to Matron Grade II, on 1st January.
Miss H. S. Cooper, Nursing Sister, promoted to Matron Grade II, on 1st January.
Miss E. C. Bosden, Nursing Sister, promoted to Matron Grade II, on 1st January.
Miss E. M. Goulding, Nursing Sister, promoted to Matron Grade II, on 1st January.
Miss A. Spence, Nursing Sister, promoted to Matron Grade II, on 12th June.
Miss S. Brown, Nursing Sister, promoted to Matron Grade II, on 6th July.

RETIREMENTS.

Nil.

RESIGNATIONS.

Miss H. S. Cooper, Matron Grade II, resigned on 12th June.
Miss G. E. Wright, Matron Grade II, resigned on 6th July.
Miss E. O. Rafferty, Nursing Sister, engagement expired on 23rd March.
Miss F. D. Howard, Nursing Sister, engagement expired on 15th December.
Miss D. M. Hansford, Nursing Sister, resigned on 1st November.
Miss M. C. Cox, Nursing Sister, resigned on 31st January.
Miss M. Duncan, Nursing Sister, resigned on 31st May.
Miss N. M. Jones, Nursing Sister, resigned on 4th August.
Miss D. M. Clarke, Nursing Sister, resigned on 8th December.
Miss E. L. James, Nursing Sister, resigned on 8th August.

ENACTMENTS.

5. No Enactments of particular medical or health significance were passed during the year.

FINANCIAL.

6. (*a*) Statement of Revenue for the year 1928 (Hospital Fees, Licences, etc.)	$ 566,983.52
(*b*) Statement of Expenditure for the year 1928 (Personal Emoluments and Other Charges) ...	6,054,610.25
(*c*) The Estimated Revenue for the Federated Malay States for the year 1928	80,318,572.00

PUBLIC HEALTH.

(*a*).—GENERAL REMARKS.

7. The general health of the country may be considered as having improved during the year under review, since the death-rate was 29.63 per mille as against 32.11 for the previous year. The rate for the year 1926 was 29.32.

Death-rates for various nationalities, for the different States, for the four large towns, and for labourers on estates, are set out in the report of the Chief Health Officer, where also are shown the number of deaths reported as due to certain prevalent diseases. It may be noted from these records that the rate for Malays is well below the figures for Chinese and Indians: that the States of Perak and Selangor compare favourably with Negri Sembilan, and very favourably with Pahang, that the corrected death-rate for the large towns, with the exception of Taiping, is well below that for the country generally, the rate for Ipoh being less than half, and for Kuala Lumpur only just over two-thirds. There are shown excessively high figures for the Indian population of Negri Sembilan and Pahang.

The birth-rate shows an improvement on 1927 in each State with the exception of Pahang, the highest figures recorded being those for the Malays of Selangor, Malays of Negri Sembilan, and the Chinese of Selangor.

Infantile mortality shows an improvement all round, there being more than ten per cent. reduction in Perak and Selangor. It is, however, still high; very high in Negri Sembilan and higher still in Pahang.

During the year there was no outbreak of epidemic disease. There was a general increase in the number of sick treated at Government hospitals, both in-door and out-door, in all the States except Pahang, where the number of in-patients was lower than during the previous year, though the number of out-patients was considerably higher. The reduction of in-patients in Pahang and the lowered death-rate of 37.60 per mille as against 43.82 for 1927 may be ascribed to the fact that the conditions caused by the floods of 1926 and 1927 have greatly improved.

(*b*).—COMMUNICABLE DISEASES.

8. *Malaria.*—This disease continues to be the chief cause of sickness and death in the Federated Malay States.

The total number of deaths attributed to fever described as "malaria" was 20,053, a reduction of 683 from the previous year. There were 50,290 cases treated in Government hospitals; some of these were re-admissions. Deaths in hospitals from malaria numbered 2,637, showing a death-rate of 5.24 per cent.

The figures for malaria treated in hospitals for the last four years are as under:

Years.	Cases.	Deaths.	Death-rate per cent.
1925	23,056 ...	993 ...	4.31
1926	38,633 ...	1,792 ...	4.64
1927	49,452 ...	2,543 ...	5.16
1928	50,290 ...	2,637 ...	5.24

In the report by the Chief Health Officer will be found tables showing the number of deaths due to malaria throughout the country annually for the last ten years, and the annual death-rate from malaria for the four States and the four large towns over a period of seven years. Study of these tables reveals little progress in the mastery of the disease during this period.

9. *Blackwater Fever.*—There were 21 cases of blackwater fever, with eight deaths, as compared with eight cases and three deaths in 1927. Twelve of these cases occurred in Negri Sembilan, of which three were fatal. Malarial parasites were detected in the blood of five cases, *Plasmodium falciparum* being present in two, *P. vivax* in two, and both *P. falciparum* and *P. vivax* in one.

10. *Dysentery and Diarrhoea.*—The total number of cases treated in hospitals was 6,629, with 1,465 deaths and a death-rate of 22.10 per cent., as against 6,857 with 1,605 deaths and a death-rate of 23.40 per cent. for 1927. The classification of these cases is shown in the following table:

States.	Amoebic dysentery.	Deaths.	Bacillary dysentery.	Deaths.	Undefined dysentery.	Deaths.	Diarrhoea.	Deaths.
Perak	1,183	185	618	179	249	24	1,077	175
Selangor	344	68	899	414	74	12	730	96
Negri Sembilan	260	65	500	144	19	7	257	21
Pahang	76	8	173	34	41	11	129	22
Total ...	1,863	326	2,190	771	383	54	2,193	314

The total number of deaths reported throughout the country as due to dysentery or diarrhoea was 1,900.

11. *Venereal Disease.*—The total number of cases treated in hospitals during the year was 5,161, with 98 deaths, as compared with 5,236 with 74 deaths for the previous year. In addition 35,366 cases were treated in clinics and treatment centres, against 25,744 cases in the previous year.

Further information will be found in Appendix H, wherein is a very full account of the work carried out during the year for the treatment and prevention of venereal diseases, together with tables of statistics.

12. *Pulmonary Tuberculosis.*—The number of cases treated in hospitals during the year was 2,452, with 1,074 deaths and a death-rate of 43.80 per cent., as compared with 2,413 cases with 1,118 deaths and a death-rate of 46.33 for the year 1927. The death-rate remains high; but this is understandable, as the majority of patients only come into hospital when in the last stages of the disease.

The number of deaths reported throughout the country as due to pulmonary tuberculosis was 1,977: the numbers annually reported for the last six years have remained remarkably constant about the figure of 2,000.

13. *Yaws.*—The treatment of yaws by arsenical compounds was continued. A total number of 30,227 injections were given during the period under review. The number of cases treated in each State, in comparison with the numbers treated in 1924, 1925, 1926 and 1927, is shown in the following table:

States.	1924.	1925.	1926.	1927.	1928.
Perak	9,884	... 9,155	... 9,358	... 2,307	... 10,007
Selangor	2,231	... 1,305	... 1,680	... 2,504	... 1,999
Negri Sembilan	7,267	... 6,426	... 4,543	... 4,465	... 4,280
Pahang	3,997	... 9,403	... 7,893	... 3,913	... 3,286
Total ...	23,379	... 26,289	... 23,474	... 13,189	... 19,572

It is believed that the systematic efforts which have been made to eradicate this disease have resulted in a marked decrease in its incidence.

14. *Leprosy.*—There were 303 fresh admissions and 69 deaths from this disease during the year, as compared with 480 admissions and 80 deaths in 1927. Further information will be found on page 13 and in Appendix L, where is a full account of the Federal Leper Settlement at Kuala Lumpur.

15. *Cancer.*—The number of cases admitted and treated in hospitals under the heading of "cancer or other malignant tumours" was 314 with 130 deaths.

Further information on tumours removed by operation or examined post mortem will be found in the report of the Institute for Medical Research, under the heading "Autopsies".

16. *Cholera.*—It is satisfactory to report that no case occurred during the year in the Federated Malay States.

17. *Plague.*—There were five cases, all fatal, in Perak during the year, as compared with thirty-three cases, with thirty deaths, throughout the country last year.

Of these five cases, three were bubonic, one was bubonic and septicaemic, and one septicaemic. Three of the cases were treated with mercuro-chrome, and two with iodine. All the cases were admitted in a more or less moribund condition.

18. *Typhus Fever.*—Fifty-seven cases of tropical typhus were admitted into hospital, with three deaths, as compared with 84 cases and 18 deaths in 1927. An account of certain investigations into the aetiology of this disease will be found in the report of the Institute for Medical Research.

19. *Enteric Fever.*—There were 153 cases treated in hospitals, with 37 deaths, as compared with 168 cases and 26 deaths for 1927. The incidence in the four States is shown below:

States.	Cases.	Deaths.
Perak	67	... 15
Selangor	45	... 7
Negri Sembilan	23	... 7
Pahang	18	... 8
Total ...	153	... 37

20. *Diphtheria.*—There were fifty-seven cases treated in hospitals with eight deaths, as compared with forty-seven cases and fourteen deaths in 1927. Of the fifty-seven cases twenty-five were admitted from Kuala Lumpur Town. The incidence in the four States is shown below:

States.	Cases.	Deaths.
Perak	14	1
Selangor	31	5
Negri Sembilan	11	2
Pahang	1	—
Total	57	8

21. *Influenza.*—There were 4,485 cases admitted to hospitals, with twenty-three deaths, as against 5,842 cases and forty-three deaths in 1927. This disease continues to be of a very mild type.

22. *Pneumonia.*—The number of cases treated in hospitals was 3,246 with 1,511 deaths and a death-rate of 46.55 per cent., as against 3,021 cases with 1,440 deaths and a death-rate of 47.67 per cent. for the year 1927. These death-rates are excessively high. The late stage of the disease in which most of the patients seek admission, and the poor physical condition of many of them, are doubtless contributory causes of so high a mortality.

In the District Hospital, Taiping, trial was made of "omnadin" in the course of treatment of thirty cases of pneumonia, and the results are reported as favourable, though the figures submitted indicate a very slight reduction in mortality.

In the District Hospital, Ipoh, nine cases of pneumonia were treated with subcutaneous injections of oxygen, and all nine patients recovered. The opinion expressed by the Medical Officer, as the result of his experience with these cases, is that though the duration of the fever is not apparently affected, there is some reduction in temperature, and a very marked relief of dyspnoea. It is this last effect to which he attaches greatest importance: injections of oxygen afforded great relief to the patients, restlessness was diminished, and comparatively comfortable sleep induced. Injections of about 200 c.c., into the loose tissues of the axilla, were given daily until the temperature fell to normal. Trial of this treatment is being continued.

The total number of deaths reported throughout the country during the year as due to pneumonia was 2,893.

23. *Smallpox.*—Ten cases occurred in the district of Ulu Langat in Selangor: there were no deaths.

24. *Beri-beri.*—The number of cases treated in hospitals was 2,098 with 239 deaths and a death-rate of 11.39 as compared with 2,782 cases with 447 deaths and a death-rate of 16.07 for the year 1927. The total number of deaths reported throughout the country was 620. The decrease in the incidence of this disease was most marked in Pahang, and was probably due to the fact that fresh vegetables and home-grown *padi* were once more available. There was a great shortage of these in the previous year owing to the destruction of vegetable gardens and *padi* crops by the floods which occurred in 1926 and early 1927.

The preparation of Vitamin B extract was continued at the Institute for Medical Research, and supplies were issued to the hospitals for treatment of cases. Experiments were carried out at the Institute for Medical Research with the object of supplying the extract in tabloid form instead of as a fluid. An account of this work will be found in the report of the Institute (Appendix A).

HELMINTHIC DISEASES.

25. *Ankylostomiasis.*—The number of cases admitted to hospitals and treated under the diagnosis of ankylostomiasis was 2,145 and the deaths numbered 91. The total number of deaths reported throughout the country as due to ankylostomiasis was 254.

Many more hospital patients than those classified under the diagnosis of ankylostomiasis were found to be suffering from ankylostome infestation and were treated accordingly. In the absence of any other statistics it may be recorded that in the course of routine faecal examination of hospitals patients, the findings were as follows:

20,924 specimens: ankylostome ova noted in 1,257, or about 6 per cent.
82,853 specimens: ankylostome ova noted in 6,715, or about 8 per cent.
68,804 specimens: ankylostome ova noted in 5,884, or about 8.5 per cent.

26. *Ascariasis.*—Two thousand eight hundred and ten patients were admitted to hospitals and treated for infestation by Ascaris: among these cases there were thirty-two deaths. There is no doubt that Ascaris infestation is generally prevalent in the population, and frequently severe, leading often to serious conditions which, as will be seen for the hospital returns, sometimes prove fatal. In one case, a Tamil woman, who died with acute abdominal symptoms, 1,488 adult worms were collected and counted at the post-mortem examination.

The only available figures referring to the extent of infestation in the population are those provided by routine faecal examination of hospital patients. From these it appears that in the series of 20,924 specimens already referred to in connexion with ankylostomiasis ova of Ascaris were noted in 1,682, giving an infestation rate of about 8 per cent.; while in the series of 68,804 specimens, ova were found in 10,503, or about 15 per cent.

Investigation is required into the part played by Ascaris infestation in the excessive sickness and mortality of infants and young children: it is a fair assumption that it may be responsible for much. In the meantime the Infant Welfare Centres should be exercising an influence in the right direction, while the increasing demand for anthelminthic medicine is also favourably significant. It is worth noting that the returns from Infant Welfare Centres record 22,171 cases of "worms".

(c).—VITAL STATISTICS.

27. These are set out in detail in the report of the Chief Health Officer: there is therefore no occasion to repeat figures or tables here.

POPULATION.

28. The last census was made in 1921. The figures shown for the present year are estimated at a rate of increase deduced from previous records. Since immigration and emigration of labourers and their dependents have not been completely tabulated, yet are important and very variable factors in population variation, the estimates of population are not entirely trustworthy.

The total population, as estimated at the end of June, 1928, was 1,533,612.

BIRTHS.

29. The number of births registered was 52,771, representing a birth-rate of 34.41 per mille. The number of births registered was 4,758 more than the previous year.

DEATHS.

30. The number of deaths registered was 45,437, representing a death-rate of 29.63 per mille. The number of deaths registered was 2,886 less than the previous year. The recorded causes of death must, in many cases, be accepted with considerable reserve.

INFANT MORTALITY.

31. The number of reported deaths of children under one year of age was 9,610, an infantile mortality rate per thousand births of 182.11 against a mortality rate of 203.11 in 1927. The death-rates for the four States were:

State.	Deaths of children under one year.	Death-rate per 1,000 births.
Perak	3,691	161.52
Selangor	3,041	169.31
Negri Sembilan	1,443	211.49
Pahang	1,435	279.40
Total	9,610	182.11

(d).—GENERAL EUROPEAN POPULATION.

32. The general health of the European population continued to be good.

The total European and American population, as estimated at the end of December, 1928, was 7,429.

There were 148 births, a birth-rate of 19.92 per mille, and 41 deaths, a death-rate of 5.52 per mille; as compared with a birth-rate of 16.56 per mille; and a death-rate of 4.87 per mille for the previous year.

SANITATION.

33. In accordance with previous custom, the report of the Chief Health Officer is reproduced *in extenso* (Appendix B) and, since all subjects which come under the heading of "Sanitation" are there dealt with, it is unnecessary in this part of the report to make more than running reference to a few salient features.

34. The Health Branch of the Medical Department was increased during the year by the addition of nine newly recruited Health Officers. With this increase in staff it was found practicable to post additional Health Officers as under:

Kuala Kangsar;
Tapah;
Kinta district;
Klang and Port Swettenham;
Tampin;
Kuala Lumpur (Second Health Officer).

Now that the Health Branch has been so augmented, it should prove possible to undertake more thoroughly general health measures throughout all sections of the population. In particular, more attention can be given to the question of the health of estate labourers.

INSPECTION OF SCHOOLS.

35. This subject is dealt with in the report of the Chief Health Officer (Appendix B). Besides the work carried at by the Health Branch, visits of inspection are made by Medical Officers, and others such as Assistant Surgeons when on duty with travelling dispensaries.

The appointment of a Lady Medical Inspector of Schools has marked the commencement of school inspection work on a systematic basis. The experience which is being gained as the result of this appointment, and the prospect of further appointments for this special duty, promise real progress in this most important branch of health work.

PUBLIC HEALTH EDUCATION.

36. The Committee for Public Health Education continues its activities. Health exhibitions were held at the Agri-Horticultural Shows at Ipoh, Taiping and Teluk Anson, and these were well attended. Lectures were given, and pamphlets in various languages, which had been prepared by the Committee, were distributed in large numbers.

The 1928 Malayan Exhibition was held on the Ipoh Race-course from 3rd to 6th August. A public health section was arranged by the Malaria Advisory Board, in conjunction with the Committee for Public Health Education and the Infant Welfare Advisory Board, the Institute for Medical Research, and the Venereal Diseases Specialist.

The exhibits were housed in a large building, one side of which was taken up by Infant Welfare exhibits, the other side containing exhibits dealing with malaria, venereal disease, yaws, hookworm disease, beri-beri, trachoma, leprosy, rabies and other general public health subjects.

The malaria exhibits included living specimens of both anopheline and culicine larvae, and with their natural enemies, other water insects and larvae-eating fish. Demonstrations were frequently given showing the destructive powers of these fish, and these attracted a great deal of interest.

There were also shown photographs of various places where malaria was formerly very prevalent, and the results obtained after drainage had been carried out. The effect of sub-soil drainage pipes being laid at an insufficient depth or too close to trees was demonstrated by short sections of pipes which had become choked by tree roots and thereby rendered ineffective, and samples of good and bad types of sub-soil pipes were on view. Methods of personal prophylaxis were illustrated by means of a model mosquito bed, a mosquito-proof hospital, mosquito boots, etc.

As this was the first occasion on which there had been an exhibition on so large a scale at Ipoh, there was a great number of visitors from all parts of the country, the official attendance for the four days of the exhibition having been approximately 40,000.

Popular lectures on malaria were given in Malay and Chinese in various parts of the country; these were illustrated by lantern slides, and were well attended. Other lantern lectures on the dangers of venereal diseases were also given.

A cinematograph film of work done at the Infant Welfare Centre, Kuala Lumpur, was exhibited on several occasions to large and interested audiences of various nationalities.

QUARANTINE AND PORT HEALTH WORK.

37. This is dealt with in the report of the Chief Health Officer.

A great part of the immigration into Malaya is through the ports of Singapore and Penang, both in the Straits Settlements. The Medical Department of the Federated Malay States is chiefly concerned with Port Swettenham, which admits large numbers of Indian labourers. Of forty-six ships arriving at this port during the year, seven were infected, including four with smallpox and one with cholera.

The total of immigrants passed through the Quarantine Camp at Port Swettenham was much lower than in the years immediately previous.

INFANT WELFARE WORK.

38. In addition to the Infant Welfare Centres at Kuala Lumpur, Ipoh, Taiping and Seremban, which continued working satisfactorily during the year, a new Centre was opened at Klang in June. This has already dealt with a large number of attendances.

A general history and description of the work of the Infant Welfare Centres has been submitted by the Chief Health Officer (Appendix B), together with a tabulated statement of attendances.

The number of attendances at Centres throughout the country for each of the last three years is shown hereunder.

1926	61,365
1927	92,476
1928	118,257

A large part of the work is not purely infant welfare, for it is impossible to avoid ordinary out-patient treatment for minor ailments of women and children: but since this work is directly calculated to gain the confidence of the mothers and has at least an indirect bearing on infant welfare, it is all to the good.

An important part of the work of a Centre consists of visits by European Sisters or other Health Visitors to women and children in their homes. The number of such visits made during the year was recorded as 71,631 of which over 21,000 were made by European Sisters. The total number of visits in the preceding year was recorded as 57,959.

The marked decline in infantile mortality during the last few years can justifiably be attributed at least in part to the work of the Infant Welfare Centres.

HOSPITALS, DISPENSARIES, AND OTHER INSTITUTIONS.

39. *In-Patients.*—The number of in-patients treated in Government hospitals was 143,361 with 11,329 deaths and a death-rate of 7.90 as compared with 142,094 with 11,743 deaths and a death-rate of 8.26 in 1927. The distribution of patients in the different States was as shown below:

	1927.			1928.		
State.	Cases.	Deaths.	Death-rate.	Cases.	Deaths.	Death-rate.
Perak	61,050 ...	4,811 ...	7.88 ...	62,888 ...	4,536 ...	7.21
Selangor ...	43,838 ...	3,608 ...	8.23 ...	44,801 ...	3,714 ...	8.28
Negri Sembilan	23,116 ...	2,250 ...	9.73 ...	23,349 ...	2,155 ...	9.22
Pahang	14,090 ...	1,074 ...	7.61 ...	12,323 ...	924 ...	7.49
Total ...	142,094 ...	11,743 ...	8.26 ...	143,361 ...	11,329 ...	7.90

40. In accordance with previous custom there is here presented a table showing the number of cases and deaths, in Government hospitals, under the headings of various diseases, for the year under review and the preceding year. This table has been compiled from the reports of the Senior Medical Officers of the four States. The diseases have been selected as those responsible for the largest number of admissions and deaths.

Diseases.	1927. No. of cases.	1927. No. of deaths.	1927. Percentage of deaths.	1928. No. of cases.	1928. No. of deaths.	1928. Percentage of deaths.
Malaria	49,452	2,543	5.14	48,585	2,522	5.19
Venereal diseases	5,236	74	1.41	5,047	97	1.92
Ankylostomiasis	2,284	94	4.12	2,263	95	4.20
Dysentery	4,797	1,294	26.98	4,396	1,143	26.00
Diarrhoea	2,577	379	14.71	2,210	310	14.03
Beri-beri	2,782	447	16.07	1,864	218	11.70
Pneumonia	3,021	1,440	47.67	3,120	1,426	45.71
Pulmonary tuberculosis	2,413	1,118	46.33	2,437	1,067	43.78

41. These figures shown above may not be found to correspond exactly with those contained in "Table I: Return of Diseases and Deaths (in-patients) for the year 1928" (page 17). In this connexion it may be not inappropriate to call attention to one or two other diseases, not included in the table above, which, as will be apparent from a study of Table I, have been responsible for a large number of admissions. Influenza accounted for 4,396 admissions, and bronchitis for 3,210. Under "Anaemia" are recorded 1,550 admissions, with 457 deaths: 172 of these cases are reported as pernicious anaemia. Ascaris infestation has been already mentioned, with 2,810 admissions on this account. Diseases of the skin include a very large number of cases, of which 1,399 were scabies. Finally, 5,150 admissions are shown under "Others including Ulcers", and of these a large proportion must be ascribed to the condition of chronic ulcer, a complaint which is responsible for much invaliding and makes great demands on hospital accommodation and treatment.

42. *Women's Hospitals and Wards.*—The work in the women's hospitals and wards continues to increase. The number of confinement cases recorded under the description of "normal labour" was 2,961. Malay women are being admitted as in-patients in gradually increasing numbers, but there is still much reluctance on their part to enter hospitals, especially for confinement.

The children's ward at Ipoh hospital continues to function successfully, and it is gratifying to note the number of children of both sexes who are admitted. It is found that most of the ailments are due to faulty feeding and when the children are removed from their parents' control they respond well to correct feeding.

SURGERY.

43. *Operations.*—The number of operations undertaken during the year is shewn below, with figures for the preceding year for comparison.

State.	Major. 1927.	Major. 1928.	Minor. 1927.	Minor. 1928.
Perak	541	625	2,858	3,727
Selangor	503	605	1,817	2,109
Negri Sembilan	186	210	1,607	1,707
Pahang	36	23	400	431
Total	1,266	1,463	6,682	7,974

The reports of the Chief Surgeons are attached. (Appendices D, E and F.)

EYE DISEASES.

44. *Out-Patients.*—The number of new cases treated during the year at the Eye Clinics is shown below, with figures for the preceding year for comparison.

	1927.	1928.
Kuala Lumpur	4,178	4,443
Ipoh	5,646	3,890
Seremban	1,746	2,682

45. *In-Patients.*—One thousand seven hundred and forty-two cases were admitted into hospitals, as compared with 1,565 cases during the year 1927.

The reports of the Ophthalmic Surgeon and the Assistant Ophthalmologist are attached. (Appendices G and H.)

CURE OF OPIUM HABIT.

46. There were only three admissions for the cure of opium habit. As mentioned in last year's report there is little demand for this treatment.

X-RAY AND ELECTRICAL TREATMENT.

47. The figures given below show the actual number of patients treated or examined by the Radiologist.

	1927.	1928.
X-ray cases	2,300	2,965
Electrical treatment	850	1,269

DISPENSARIES AND OUT-PATIENTS.

48. The number of out-patients treated in all hospitals, dispensaries, travelling dispensaries and dispensary boats for 1928 was 895,948 as compared with 789,764 in 1927 and 630,052 in 1926.

The following figures show the number treated during the last four years:

State.	1925.	1926.	1927.	1928.
Perak	216,282	210,511	292,087	347,428
Selangor	219,739	227,864	286,843	307,449
Negri Sembilan	99,047	101,652	108,314	127,970
Pahang	86,725	90,025	102,520	113,101
Total	621,793	630,052	789,764	895,948

Of the total of 895,948 cases 200,168 were treated by the travelling dispensaries and 36,254 by dispensary boats on the Perak and Pahang rivers.

The two motor dispensary boats, "Bomor" and "Pawang", continued this work on the Perak and Pahang rivers. By carrying out regular trips, it is possible for the Medical Officer or Lady Medical Officer detailed for the duty to visit *kampongs* along the river-banks at pre-arranged times, and so, to attend to the patients who had assembled at the landing place. Opportunity was also afforded for inspecting schools, while occasionally visits to sick persons in their own houses were requested. The work of the "Pawang" was interrupted by her having to be sent to Singapore for structural alterations.

PRISONS.

49. During 1928 the general health of the prisoners has continued to be satisfactory. The total number treated during the year in the gaol hospitals was 896 with 15 deaths and a death-rate of 1.67 as compared with 853 with 32 deaths and a death-rate of 3.75 in 1927. The following table sets out the figures for the various gaols:

	1927.			1928.		
Place.	Cases.	Deaths.	Per-centage.	Cases.	Deaths.	Per-centage.
Pudu Gaol	109	2	1.78	129	—	—
Taiping Gaol	178	12	6.74	235	8	3.40
Batu Gajah Gaol	319	9	2.82	229	4	1.75
Seremban Gaol	156	6	3.87	233	2	.85
Kuala Lipis Gaol	47	2	4.44	39	1	2.56
Kuantan Gaol	44	1	2.27	31	—	—
Total	853	32	3.75	896	15	1.67

LEPER ASYLUMS.

50. *Kuala Lumpur.*—The total number of lepers treated during the year was 1,014, as against 818 for the previous year. There were 58 deaths giving a death-rate of 7.09 per cent. as compared with 818 treated and a death-rate of 7.81 per cent. in 1927.

The report of the Medical Officer in charge of the Asylum is attached as Appendix L.

51. *Pulau Pangkor Laut (for Malay Lepers only).*—Sixty-three cases of leprosy were treated during the year with six deaths as compared with seventy-two cases and fifteen deaths in 1927. Tai Foong Chee with Foh Mah Yen treatment for leprosy was continued throughout the year. E.C.C.O. injections were continued, but only a few patients were willing to have this treatment.

52. *Taiping Leper Wards.*—One hundred and seventy-five cases were treated, with four deaths. These wards have now been closed as receiving wards for the State, although an occasional case is sent in as a matter of habit from other hospitals. The wards are old and resembled a prison and the patients were as a result, always miserable and frequently violent. Taiping lepers will still need accommodation during the short period they remain before they are sent to Kuala Lumpur Leper Asylum.

Pulau Jerejak.—On 31st December, 1928, there were 127 lepers from Perak accommodated at Pulau Jerejak in the Straits Settlements.

TEMPORARY CHINESE DECREPIT ASYLUM, PORT SWETTENHAM.

53. There remained on 1st January, 1928, 186 decrepits: the number remaining at the close of the year was 167. No new decrepits were admitted to the Home during the year. There are many decrepits still in hospitals who should be transferred to the new Decrepit Settlement at Sungei Buloh, near Kuala Lumpur, as soon as this can be completed, thus releasing accommodation intended and required for the sick.

VETERINARY BRANCH.

54. The Veterinary Service of the Federated Malay States remains under the control of the Medical Department. There is here submitted a summary of the reports of the Veterinary Surgeons from the four States.

There was a Veterinary Surgeon, with subordinate staff, in charge of each of the following areas:

Perak North;
Perak South;
Selangor;
Negri Sembilan;
Pahang West;
Pahang East.

ANIMAL DISEASES.

RINDERPEST.

55. In Perak North there was an outbreak in June, forty fatal cases in buffaloes occurring. In Perak South, in the Kinta district, there were seventy cases, of which thirty-five died and one was destroyed, thirty-four recovered. Over three hundred head of cattle were inoculated with anti-rinderpest serum and only one case occurred in an inoculated animal.

In Selangor, there were two outbreaks at Port Swettenham, among cattle imported from India, and one at Klang: in all these were fifty-one cases, with thirty-two deaths and three destroyed.

In Negri Sembilan, after one isolated case at Seremban, and five cases elsewhere, an outbreak occurred near Bahau, when there were seventy-eight buffaloes attacked, of which forty-eight died, twenty-five were destroyed, and five recovered. Later there was another outbreak at Gemas, in which thirty-five cattle were affected, of which twenty-seven died and the rest recovered.

In Pahang West there was no case reported.

In Pahang East, five buffaloes were attacked in a small outbreak, and all died.

The following table summarizes the cases:

State.	Cases.	Deaths.	Destroyed.
Perak	110	75	1
Selangor	51	32	3
Negri Sembilan	119	81	25
Pahang	5	5	—
Total	285	193	29

Foot-and-Mouth Disease.

56. In Perak North there was an outbreak among buffaloes of forty-three cases, none fatal. Later there were cases among cattle. In Perak South there were local outbreaks in bovines, in all fifty-nine cases, with one death. In Selangor there were seventy-two cases at Port Swettenham and Kuala Lumpur, among cattle from India and Singapore, and sporadic cases elsewhere. In Negri Sembilan there were outbreaks in the Seremban district, and at the end of the year at Gemas: in 178 cases there were no deaths. In Pahang West the outbreak in Raub which occurred at the end of 1927 continued during January, in all thirty-seven cattle were affected. There was also an outbreak at Bentong in which twenty-six oxen and fifteen pigs were affected: the infection was traced to pigs imported from Siam. No case was reported for Pahang East.

The disease throughout the country was reported to be of the usual mild type.

The following table summarizes the cases:

State.	Cases.	Deaths.	Destroyed.
Perak	102	1	—
Selangor	197	4	—
Negri Sembilan	178	—	—
Pahang	78	—	—
Total	555	5	—

Rabies.

57. Sixty-two cases of rabies occurred during the year, the distribution being as under:

Negri Sembilan	9 cases.
Selangor	51 ,,
Perak	2 ,,

Perak.—Two cases of canine rabies occurred at Batu Gajah in the month of September. The first affected animal—a puppy—died, and the second—an adult dog—was destroyed during the initial stage of illness.

Over five hundred dogs were inoculated with protective vaccine. Special dog shooters were employed to deal with unlicensed dogs in the "specified area" and to help enforce the muzzling order. Difficulty was experienced in obtaining adequate supplies of anti-rabic vaccine, so that the work of protecting licensed dogs by prophylactic inoculation was somewhat delayed.

Selangor.—This disease occurred in Kajang, Kuala Langat, Klang and Kuala Lumpur districts, the first cases being found at Kajang during February.

Fifty-one cases (50 dogs and 1 cow) were found to be infected during the year, six cases occurring in the Kajang district, 26 in the Kuala Lumpur district, 11 in the Klang district and eight in the Kuala Langat district.

Sixty-one contact dogs which were considered likely to have become infected were destroyed. One hundred and thirty-three dogs which had bitten people were traced and kept under observation for 10 days before being certified healthy. One thousand two hundred and fifty-four dogs were inoculated with canine anti-rabic vaccine during the year, these being mostly dogs which were kept in the vicinity of cases of rabies and which were therefore most likely to have been bitten by rabid dogs; of these two developed rabies within a month after vaccination, and one after about four months.

Negri Sembilan.—Nine cases of rabies were reported or discovered amongst dogs during the year. Five of these cases occurred near Siliau in the Coast district and the others were isolated cases in different areas. Fifteen suspected brains, including the nine mentioned above, were sent to the Institute for Medical Research for examination, and 32 cases of dogs having bitten people were investigated and the dogs kept under observation; one of these proved to be a case of rabies. In all, 86 dogs were vaccinated: of these, three developed rabies.

Swine Fever.

58. *Negri Sembilan.*—Nine pigs from a batch of pigs brought from near Sepang died of this disease in Seremban abattoirs. No more pigs were allowed into the styes at the abattoirs until all the pens had been empty for seven days, and thoroughly disinfected, and all the old wooden temporary partitions burnt.

Pahang.—There was a small localized outbreak in the Kuantan district: thirteen pigs were affected all of which died: every precaution was taken and no spread of the disease occurred. In the Pekan district a cargo of nine pigs imported from Singapore developed swine fever and died.

Surra.

59. *Pahang.*—One dog with surra, alive at the end of last year, died in January. One of the 850 buffaloes imported from Siam in November died in Padang Besar Quarantine Station, and from its blood an organism similar to the *Trypanosoma evansi* was recovered. Five other animals died in this herd before distribution to the villages, but no organism was discovered. Since then some of these animals have been reported as not thriving and two have died.

Haemorrhagic Septicaemia.

60. In Perak North an outbreak occurred among buffaloes near Padang Rengas: this appeared to be an enzootic. Eighty-four cases occurred, all fatal. Another outbreak, of six fatal cases, occurred at Port Weld.

In Perak South there were two outbreaks in the Kinta district with a total of 240 cases, with 235 deaths. Later there were two further outbreaks in the Kinta district: in the first, where serum prophylaxis was refused, there were 23 cases, all fatal, out of a herd of 33 buffaloes: in the second, there were 18 cases with one recovery, and out of 166 contact buffaloes which were inoculated with specific anti-serum only two contracted infection.

In Selangor there were two small outbreaks at Port Swettenham, among buffaloes from Siam, and one at Batu Tiga: in all 9 cases, all fatal.

VETERINARY QUARANTINE STATIONS.

61. Sixteen thousand seven hundred and sixty-three animals were imported via Port Swettenham, of which 4,436 cattle were quarantined for ten days. Two outbreaks of rinderpest and one of foot-and-mouth disease were detected amongst newly imported animals. Eight hundred and forty-two cattle were quarantined at Kuala Lumpur. Three outbreaks of foot-and-mouth disease occurred in these animals.

In Pahang 850 cow buffaloes were imported from Bangkok via Padang Besar and distributed amongst the villages that suffered during the floods of 1926-1927. Of these eight have since died, probably some of these deaths being due to surra as previously mentioned.

In Perak the following cattle were quarantined:

Port Weld	6,075
Upper Perak	390
Parit Buntar	70
Selama	101
Teluk Anson	2.254
Via Padang Besar	659

In Negri Sembilan the following animals were passed through the Cattle Quarantine Stations during the year:

Seremban	10 cattle	63 buffaloes	40 sheep	35 goats.
Port Dickson	1 ,,	137 ,,	185 ,,	108 ,,
Tampin	28 ,,	10 ,,	—	—
Gemas	99 ,,	—	251 ,,	—

VETERINARY PROSECUTIONS.

62. There were a total number of 1,215 prosecutions resulting in 1,134 convictions. The fines imposed amounted to a total of $9,730.75. They were distributed as follows:

State.	Prosecutions.	Convictions.	Fines.
Perak	478 ...	439 ...	$3,781.00
Selangor	488 ...	455 ...	3,486.50
Negri Sembilan	192 ...	183 ...	1,990.25
Pahang	57 ...	57 ...	473.00
Total ...	1,215 ...	1,134 ...	$9,730.75

63. The following are attached as appendices.

A.—Report of the Director, Institute for Medical Research, including the following:

  (*a*) Report of the Division of Bacteriology.
  (*b*) Report of the Division of Chemistry.
  (*c*) Report of the Division of Pathology.
  (*d*) Report of the Division of Entomology.
  (*e*) Report of the Malaria Research Division.

B.—Report of the Chief Health Officer, Federated Malay States, including the work at Infant Welfare Centres.

C.—Report of the Registrar-General of Births and Deaths.

D.—Report of the Chief Surgeon, Perak.

E.—Report of the Chief Surgeon, Selangor.

F.—Report of the Chief Surgeon, Negri Sembilan.

G.—Report of the Medical Superintendent, Central Mental Hospital, Tanjong Rambutan.

H.—Report of the Specialist, Venereal Diseases.

I.—Report of the Opthalmologist Surgeon, Ipoh.

J.—Report of the Deputy Medical Officer in charge of Opthalmic Clinic, Kuala Lumpur.

K.—Report of the Radiologist, Federated Malay States.

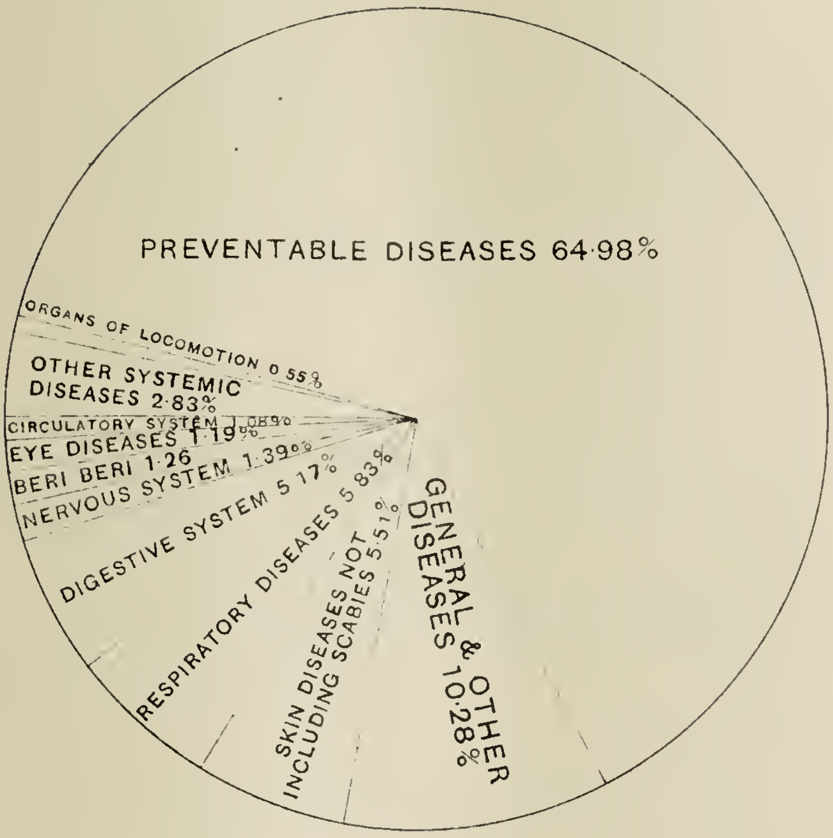
L.—Report of the Medical Officer in charge of Leper Asylum, Kuala Lumpur.

CHRISTOPHER J. WILSON,
Principal Medical Officer, F.M.S.

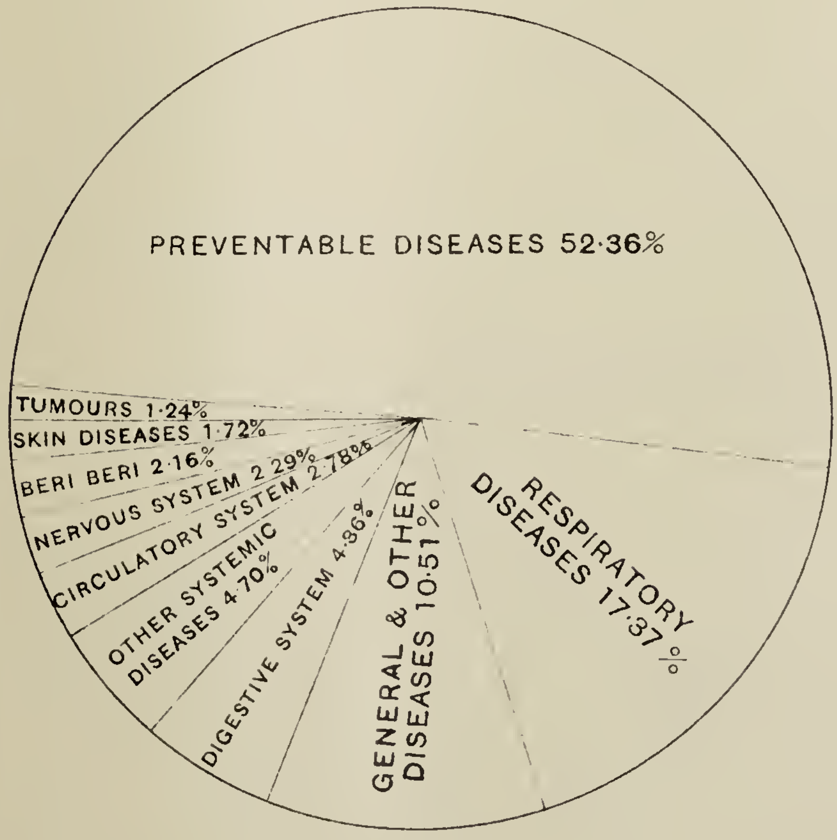
May, 1929.

GENERAL SYSTEMIC & PREVENTABLE DISEASES.

TOTAL CASES - 95554

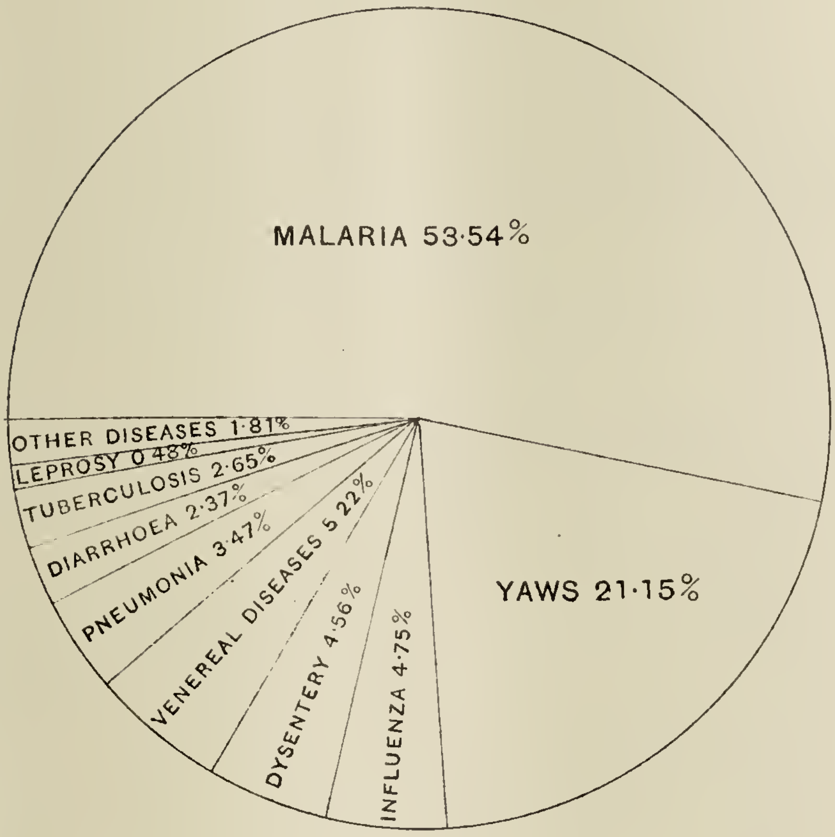


TOTAL DEATHS - 11077



INFECTIVE DISEASES

TOTAL CASES - 95554



TOTAL DEATHS 7255

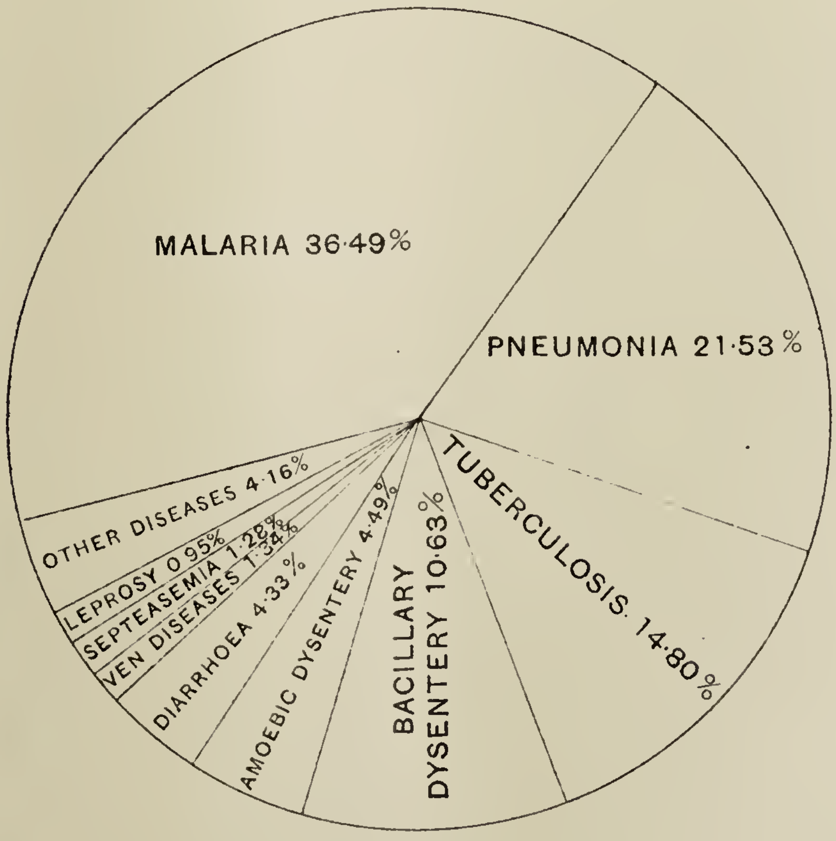


Table 1.

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1928.

The form shows in the main the arrangement of diseases in the International Nomenclature, 1921 Edition. To save space the unimportant diseases of any class can be grouped in their places as "Other Diseases" of the class.

* i.e., the year previous to that for which the return is made.

† "Total cases treated" will, of course, include those remaining in hospital at the end of the previous year.

‡ The figures in this column to be carried on to the next year's return.

Diseases.	* Remaining in hospital at end of 1927.	Yearly total.		† Total cases treated.	‡ Remaining in hospital at end of 1928.	Remarks.
		Admissions.	Deaths.			
I.—EPIDEMIC, ENDEMIC, AND INFECTIOUS DISEASES.						
1. Enteric group—						
(*a*) Typhoid fever	9	112	26	121	9	
(*b*) Paratyphoid A.	1	20	9	21	1	
(*c*) Paratyphoid B.	...	3	...	3	1	
(*d*) Type not defined	1	11	3	12	...	
2. Typhus	2	57	4	59	2	
3. Relapsing fever	...	...	...	...	...	
4. Undulant fever (*a*)	...	...	...	...	...	(*a*) In the Report for 1927 a number of cases were shown in error as Undulant Fever: No case of this disease is known to have occurred in 1927 or 1928.
5. Malaria—						
(*a*) Tertian	341	12,604	269	12,945	230	
(*b*) Quartan	16	876	24	892	27	
(*c*) Aestivo—autumnal	530	23,023	1,693	23,553	318	
(*d*) Cachexia	350	11,716	598	12,066	243	
(*e*) Black-water	...	36	10	36	1	
(*f*) Mixed infection	10	355	31	365	2	
(*g*) Unclassified	11	943	22	954	15	Diagnosis not confirmed by microscope.
6. Smallpox	...	...	...	...	...	
7. Measles	5	129	4	134	3	
8. Scarlet fever	...	...	...	...	...	
9. Whooping cough	4	35	1	39	3	
10. Diphtheria	...	54	8	54	2	
11. Influenza	89	4,396	23	4,485	70	
12. Miliary fever	...	...	...	...	...	
13. Mumps	3	78	1	81	7	
14. Cholera	...	...	...	...	...	
15. Epidemic diarrhœa	...	...	...	...	...	
16. Dysentery—						
(*a*) Amœbic	84	1,779	326	1,863	56	
(*b*) Bacillary	102	2,088	771	2,190	76	
(*c*) Undefined or due to other causes ...	27	356	54	383	19	
17. Plague—						
(*a*) Bubonic	...	4	4	4	...	
(*b*) Pneumonic	...	...	...	...	...	
(*c*) Septicæmic	...	1	1	1	...	
(*d*) Undefined	...	...	...	...	...	
18. Yellow fever	...	...	...	...	...	
19. Spirochætosis	...	6	...	6	...	
Ictero-hæmorrhagica	1	10	2	11	...	
20. Leprosy	799	442	69	1,241	930	
21. Erysipelas	5	81	19	86	3	
22. Acute poliomyelitis	...	1	1	1	...	
23. Encephalitis lethargica	1	4	...	5	...	
24. Epidemic cerebro-spinal fever	1	7	7	8	...	
25. Other epidemic diseases...	...	1	...	1	...	
(*a*) Rubeola (German measles)	...	5	...	5	...	
(*b*) Varicella (chicken-pox)	7	147	...	154	4	
(*c*) Kala-azar	...	...	...	...	...	
(*d*) Phlebotomus fever	...	...	...	...	...	
(*e*) Dengue	...	63	...	63	2	
(*f*) Epidemic dropsy	...	...	...	...	...	
(*g*) Yaws	12	247	...	259	18	
(*h*) Trypanosomiasis	...	...	...	...	...	

TABLE 1—(*cont.*)

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1928—(*cont.*)

Diseases.	* Remaining in hospital at end of 1927.	Yearly total.		† Total cases treated.	‡ Remaining in hospital at end of 1928.	Remarks.
		Admissions.	Deaths.			
I.—EPIDEMIC, ENDEMIC, AND INFECTIOUS DISEASES—(*cont.*)						
26. Glanders	...	...	...	...	...	
27. Anthrax	...	...	...	...	...	
28. Rabies	...	2	1	2	...	
29. Tetanus	1	53	38	54	1	
30. Mycosis	...	...	...	...	...	
31. Tuberculosis, pulmonary and laryngeal ...	163	2,289	1,074	2,452	182	
32. Tuberculosis of the meninges or central nervous system	...	12	8	12	...	
33. Tuberculosis of the intestines or peritoneum ...	1	43	35	44	1	
34. Tuberculosis of the vertebral column	...	9	...	9	1	
35. Tuberculosis of bones and joints	7	51	11	58	10	
36. Tuberculosis of other organs	...	2	2	2	...	
(*a*) Skin or subcutaneous tissue (lupus) ...	...	7	1	7	...	
(*b*) Bones	1	2	...	3	...	
(*c*) Lymphatic system	4	38	...	42	2	
(*d*) Genito-urinary	...	8	2	8	...	
(*e*) Other organs	1	6	2	7	...	
37. Tuberculosis disseminated	...	1	...	1	...	
(*a*) Acute	...	3	1	3	...	
(*b*) Chronic	...	2	1	2	...	
38. Syphilis—						
(*a*) Primary	39	924	2	963	69	
(*b*) Secondary	77	1,190	25	1,267	120	
(*c*) Tertiary	29	444	39	473	86	
(*d*) Hereditary	3	46	19	49	1	
(*e*) Period not indicated	1	29	5	30	2	
39. Soft chancre	25	340	...	365	17	
40. A.—Gonorrhœa and its complications ...	71	1,473	6	1,544	63	
B.—Gonorrhœal ophthalmia	4	106	1	110	9	
C.—Gonorrhœal arthritis	21	278	...	299	10	
D.—Granuloma venereum	1	7	1	8	1	
41. Septicæmia	1	102	93	103	...	
42. Other infectious diseases	2	377	37	379	...	
Tsutsugmushi fever	...	1	...	1	...	
II.—GENERAL DISEASES NOT MENTIONED ABOVE.						
43. Cancer or other malignant tumours of the buccal cavity	...	23	7	23	...	
44. Cancer or other malignant tumours of the stomach or liver	1	81	62	82	1	
45. Cancer or other malignant tumours of the peritoneum intestines, rectum	2	27	6	29	...	
46. Cancer or other malignant tumours of the female genital organs	2	36	7	38	3	
47. Cancer or other malignant tumours of the breast	...	13	2	13	...	
48. Cancer or other malignant tumours of the skin	1	32	6	33	1	
49. Cancer or other malignant tumours of organs not specified	1	102	40	103	5	
50. Tumours non-malignant	5	138	7	143	7	
51. Acute rheumatism	5	216	1	221	4	
52. Chronic rheumatism	6	144	1	150	5	
53. Scurvy (including Barlow's disease)	1	22	7	23	1	
54. Pellagra	...	1	...	1	...	
55. Beri-beri	306	1,792	239	2,098	290	

TABLE 1—(*cont.*)

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1928—(*cont.*)

Diseases.	* Remaining in hospital at end of 1927.	Yearly total.		† Total cases treated.	‡‡ Remaining in hospital at end of 1928.	Remarks.
		Admissions.	Deaths.			
II.—GENERAL DISEASES NOT MENTIONED ABOVE—(*cont.*)						
56. Rickets	1	6	1	7	2	
57. Diabetes (not including insipidus)	6	98	3	104	7	
58. Anæmia	12	119	27	131	4	
(*a*) Pernicious	3	172	51	175	10	
(*b*) Other anæmias and chlorosis	49	1,259	379	1,308	49	
59. Diseases of the pituitary body	...	...	...	...	...	
60. Diseases of the thyroid gland	...	2	...	2	...	
(*a*) Exophthalmic goitre	...	2	...	2	...	
(*b*) Other diseases of the thyroid gland, myxœdema	...	7	...	7	...	
61. Diseases of the para-thyroid glands	...	...	...	...	...	
62. Diseases of the thymus	...	1	1	1	...	
63. Diseases of the supra-renal glands	...	2	...	2	...	
64. Diseases of the spleen	8	101	11	109	1	
65. Leukæmia—						
(*a*) Leukæmia	...	3	1	3	...	
(*b*) Hodgkin's disease	...	2	...	2	...	
66. Alcoholism	...	50	4	50	...	
67. Chronic poisoning by mineral substances (lead, mercury, etc.)	1	19	3	20	...	
68. Chronic poisoning by organic substances (morphia, cocaine, etc.)	4	46	...	50	1	
Opium habit	...	3	...	3	...	
69. Other general diseases	39	194	27	233	9	
Auto-intoxication	...	2	1	2	...	
Purpura hæmorrhagica	...	2	...	2	...	
Hæmophilia	...	1	1	1	...	
Diabetes insipidus	...	8	...	8	2	
Plasmoguin Idrosyncrasy	...	1	...	1	...	
III.—AFFECTIONS OF THE NERVOUS SYSTEM AND ORGANS OF THE SENSES.						
70. Encephalitis (not including encephalitis Lethargica)	1	5	5	6	...	
71. Meningitis (not including tuberculous meningitis or cerebro-spinal meningitis)	4	48	42	52	1	
72. Locomotor ataxia	4	16	2	20	7	
73. Other affections of the spinal cord	2	37	8	39	7	
74. Apoplexy	...	7	5	7	...	
(*a*) Hæmorrhage	...	46	37	46	2	
(*b*) Embolism	...	2	2	2	...	
(*c*) Thrombosis	...	1	...	1	...	
75. Paralysis	1	...	...	1	...	
(*a*) Hemiplegia	31	134	31	165	38	
(*b*) Other paralyses	22	101	24	123	22	
76. General paralysis of the insane	...	2	1	2	...	
77. Other forms of mental alienation	9	577	5	586	3	
78. Epilepsy	1	107	10	108	2	
79. Eclampsia, convulsions (non-puerperal) 5 years or over	1	30	10	31	1	
80. Infantile convulsions	...	92	57	92	1	
81. Chorea	...	1	...	1	...	
82. A.—Hysteria	...	11	...	11	...	
B.—Neuritis	16	212	1	228	16	
C.—Neurasthenia	3	35	...	38	...	
83. Cerebral softening	...	2	...	2	...	
84. Other affections of the nervous system, such as paralysis agitans	6	188	9	194	5	

TABLE 1—(*cont.*)

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1928—(*cont.*)

Diseases.	* Remaining in hospital at end of 1927.	Yearly total.		† Total cases treated.	‡ Remaining in hospital at end of 1928.	Remarks.
		Admissions.	Deaths.			
III.—AFFECTIONS OF THE NERVOUS SYSTEM AND ORGANS OF THE SENSES—(*cont.*)						
85. Affections of the organs of vision—						
(*a*) Diseases of the eye	68	152	4	220	53	
(*b*) Conjunctivitis	22	519	...	541	18	
(*c*) Trachoma	25	106	...	131	20	
(*d*) Tumours of the eye	...	14	1	14	...	
(*e*) Other affections of the eye	128	903	6	1,031	158	
86. Affections of the ear or mastoid sinus	12	318	5	330	12	
IV.—AFFECTIONS OF THE CIRCULATORY SYSTEM.						
87. Pericarditis	...	18	14	18	...	
88. Acute endocarditis or myocarditis	1	45	31	46	2	
89. Angina pectoris	...	4	...	4	...	
90. Other diseases of the heart	1	74	36	75	...	
(*a*) Valvular	8	89	36	97	6	
Mitral	11	259	87	270	10	
Aortic	4	45	23	49	9	
Tricuspid	...	1	1	1	...	
Pulmonary	...	4	1	4	...	
(*b*) Myocarditis	1	62	32	63	5	
91. Diseases of the arteries—						
(*a*) Aneurism	1	18	8	19	1	
(*b*) Arterio-sclerosis	3	35	5	38	2	
(*c*) Other diseases	1	25	14	26	1	
92. Embolism or thrombosis (non-cerebral)	...	7	3	7	1	
93. Diseases of the veins	...	3	1	3	1	
Hæmorrhoids	4	224	1	228	6	
Varicose veins	...	9	...	9	...	
Phlebitis	1	15	...	16	1	
94. Diseases of the lymphatic system	1	6	...	7	...	
Lymphangitis	2	55	1	57	...	
Lymphadenitis, bubo (non-specific)	28	520	1	548	35	
95. Hæmorrhage of undetermined cause	...	1	1	1	...	
96. Other affections of the circulatory system	1	30	12	31	1	
V.—AFFECTIONS OF THE RESPIRATORY SYSTEM.						
97. Diseases of the nasal passages	2	20	...	22	1	
Adenoids	2	33	1	35	...	
Polypus	...	10	...	10	...	
Rhinitis	1	4	...	5	...	
Coryza	6	188	...	194	1	
98. Affections of the larynx	...	2	1	2	...	
Laryngitis	1	27	2	28	...	
99. Bronchitis	6	246	1	252	4	
(*a*) Acute	72	1,944	44	2,016	45	
(*b*) Chronic	52	1,020	69	1,072	63	
100. Broncho-pneumonia	28	734	337	762	28	
101. Pneumonia	...	2	...	2	...	
(*a*) Lobar	80	2,487	1,225	2,567	86	
(*b*) Unclassified	18	292	129	310	3	
102. Pleurisy, empyema	19	337	46	356	25	
103. Congestion of the lungs	...	8	3	8	1	
104. Gangrene of the lungs	...	21	17	21	1	
105. Asthma	22	820	25	842	34	
106. Pulmonary emphysema	1	12	2	13	...	
107. Other affections of the lungs	3	80	21	83	...	
Pulmonary spirochaetosis	...	1	...	1	...	

TABLE 1—(*cont.*)

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1928—(*cont.*)

Diseases.	* Remaining in hospital at end of 1928.	Yearly total.		† Total cases treated.	‡ Remaining in hospital at end of 1928.	Remarks.
		Admissions.	Deaths.			
VI.—DISEASES OF THE DIGESTIVE SYSTEM.						
108. A.—Diseases of teeth or gums	2	34	...	36	1	
Caries, pyorrhœa, etc.	3	216	7	219	4	
B.—Other affections of the mouth	...	37	4	37	1	
Stomatitis	1	79	3	80	1	
Glossitis, etc. ...	1	17	5	18	...	
109. Affections of the pharynx or tonsils	...	5	2	5	...	
Tonsillitis	3	169	1	172	2	
Pharyngitis	4	198	1	202	1	
110. Affections of the œsophagus	2	16	2	18	1	
111. A.—Ulcer of the stomach	...	71	26	71	3	
B.—Ulcer of the duodenum	1	28	1	29	2	
112. Other affections of the stomach	1	64	7	65	...	
Gastritis	5	333	9	338	6	
Dyspepsia, etc.	20	443	...	463	4	
113. Diarrhœa and enteritis	2	84	2	86	8	
Under two years	11	303	69	314	7	
114. Diarrhœa and enteritis	1	71	...	72	1	
Two years and over	48	1,673	243	1,721	61	
Colitis ...	8	132	7	140	1	
Ulceration	...	1	1	1	...	
114A. Sprue	1	62	8	63	5	
115. Ankylostomiasis	63	2,145	91	2,208	84	
116. Diseases due to intestinal parasites—						
(*a*) Cestoda (tænia)	...	6	...	6	...	
(*b*) Trematoda (flukes)	...	...	...	...	...	
(*c*) Nematoda (other than ankylostoma)	...	1	...	1	...	
Ascaris	64	2,810	32	2,874	58	
Trichocephalus dispar	...	5	...	5	...	
Trichina	...	1	...	1	...	
Dracunculus	...	17	...	17	...	
Strongylus	...	1	...	1	...	
Oxyuris	...	2	...	2	...	
(*d*) Coccidia	...	...	...	...	...	
(*e*) Other parasites	...	19	1	19	...	
(*f*) Unclassified	...	1	...	1	...	
117. Appendicitis	10	171	14	181	7	
118. Hernia ...	15	227	6	242	12	
119. A.—Affections of the anus, fistula, etc.	8	197	6	205	6	
B.—Other affections of the intestines	2	138	24	140	3	
Enteroptosis ...	2	1	...	3	...	
Constipation ...	12	783	...	795	7	
120. Acute yellow atrophy of the liver	...	2	2	2	...	
121. Hydatid of the liver	...	1	...	1	...	
122. Cirrhosis of the liver	4	70	33	74	4	
(*a*) Alcoholic	...	11	8	11	...	
(*b*) Other forms	33	310	173	343	23	
123. Biliary Calculus	...	4	...	4	...	
124. Other affections of the liver	...	12	5	12	1	
Abscess	5	74	29	79	1	
Hepatitis	7	140	5	147	7	
Cholecystitis	...	32	4	32	1	
Jaundice	1	151	18	152	7	
125. Diseases of the pancreas	...	4	1	4	...	
126. Peritonitis (of unknown cause)	...	109	80	109	1	
127. Other affections of the digestive system	9	146	11	155	4	

TABLE 1—(*cont.*)

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1928—(*cont.*)

Diseases.	* Remaining in hospital at end of 1928.	Yearly total.		† Total cases treated.	‡ Remaining in hospital at end of 1928.	Remarks.
		Admissions.	Deaths.			
VII.—DISEASES OF THE GENITO-URINARY SYSTEM (NON-VENEREAL).						
128. Acute nephritis	26	414	124	440	32	
129. Chronic	26	319	135	345	31	
130. A.—Chyluria	...	...	...	...	...	
B.—Schistosomiasis	...	...	...	...	...	
131. Other affections of the kidneys	8	82	24	90	4	
Pyelitis, etc.	1	65	8	66	1	
132. Urinary calculus	5	56	2	61	4	
133. Diseases of the bladder	2	13	1	15	...	
Cystitis	2	90	9	92	1	
134. Diseases of the urethra	...	3	...	3	...	
(*a*) Stricture	2	96	1	98	5	
(*b*) Other	21	350	2	371	17	
135. Diseases of the prostate	...	...	...	...	...	
Hypertrophy	...	3	...	3	...	
Prostatitis	3	17	...	20	2	
136. Diseases (non-venereal) of the genital organs of man	8	139	1	147	1	
Phimosis	...	5	...	5	2	
Epididymitis	1	80	...	81	2	
Orchitis	2	84	...	86	2	
Hydrocele	4	90	...	94	10	
Ulcer of penis	1	35	1	36	...	
137. Cysts or other non-malignant tumours of the ovaries	1	28	1	29	2	
138. Salpingitis	3	42	...	45	1	
Abscess of the pelvis...	...	7	1	7	1	
139. Uterine tumours (non-malignant)	1	5	...	6	...	
140. Uterine hæmorrhage (non-puerperal) ...	...	13	...	13	1	
141. A.—Metritis	...	27	...	27	1	
B.—Other affections of the female genital organs	5	148	2	153	5	
Displacements of uterus	2	84	1	86	5	
Amenorrhœa	...	8	...	8	...	
Dysmenorrhœa	...	32	...	32	...	
Leucorrhœa	2	76	...	78	...	
142. Diseases of the breast (non-puerperal) ...	...	3	...	3	...	
Mastitis	1	30	...	31	...	
Abscess of breast	3	38	...	41	2	
VIII.—PUERPERAL STATE.						
143. A.—Normal labour	93	2,961	6	3,054	103	
B.—Accidents of pregnancy	2	3	1	5	...	
(*a*) Abortion	8	247	6	255	5	
(*b*) Ectopic gestation	1	10	...	11	...	
(*c*) Other accidents of pregnancy	21	447	28	468	24	
144. Puerperal hæmorrhage	...	9	3	9	...	
145. Other accidents of parturition	2	143	27	145	3	
146. Puerperal septicæmia	4	174	78	178	5	
147. Phlegmasia dolens	1	3	...	4	...	
148. Puerperal eclampsia	...	48	16	48	1	
149. Sequelæ of labour	1	38	7	39	1	
150. Puerperal affections of the breast	...	1	...	1	...	

Table 1—(*cont.*)

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1928—(*cont.*)

Diseases.	* Remaining in hospital at end of 1927.	Yearly total.		† Total cases treated.	‡ Remaining in hospital at end of 1928.	Remarks.
		Admissions.	Deaths.			
IX.—AFFECTIONS OF THE SKIN AND CELLULAR TISSUES.						
151. Gangrene	9	73	40	82	4	
152. Boil	3	118	...	121	2	
Carbuncle	3	74	4	77	6	
153. Abscess	77	2,101	30	2,178	98	
Whitlow	3	31	...	34	1	
Cellulitis	64	651	96	715	43	
154. A.—Tinea	4	97	...	101	...	
B.—Scabies	71	1,399	...	1,470	41	
155. Other diseases of the skin	145	2,595	18	2,740	143	
Brythema	...	11	...	11	1	
Urticaria	...	56	...	56	1	
Eczema	22	498	...	520	21	
Herpes	3	80	...	83	2	
Psoriasis	...	23	...	23	3	
Elephantiasis	...	19	1	19	...	
Myiasis	...	1	...	1	...	
Chigœs	...	...	...	...	...	
Cutaneous leishmaniasis	...	...	...	...	...	
Arsenical Dermatitis...	...	17	2	17	1	
X.—DISEASES OF BONES AND ORGANS OF LOCOMOTION (OTHER THAN TUBERCULOUS).						
156. Diseases of bones	2	14	1	16	2	
Osteitis	4	54	4	58	7	
157. Diseases of joints	...	11	1	11	2	
Arthritis	14	250	5	264	27	
Synovitis	4	155	4	159	9	
158. Other diseases of bones or organs of locomotion	13	309	11	322	13	
XI.—MALFORMATIONS.						
159. Malformations	22	8	3	30	19	
Hydrocephalus	...	3	1	3	...	
Hypospadias	...	...	...	...	...	
Spina bifida, etc.	...	5	1	5	...	
XII.—DISEASES OF INFANCY.						
160. Congenital debility	...	44	34	44	1	
161. Premature birth	2	256	209	258	1	
162. Other affections of infancy	2	134	79	136	5	
163. Infant neglect (infants of three months or over)	2	62	36	64	4	
XIII.—AFFECTIONS OF OLD AGE.						
164. Senility	104	462	147	566	124	
Senile dementia	1	16	...	17	...	
XIV.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.						
165. Suicide by poisoning	...	5	3	5	...	
166. Corrosive poisoning (intentional)	...	7	4	7	...	
167. Suicide by gas poisoning	...	...	...	...	...	
168. Suicide by hanging or strangulation... ...	...	6	4	6	...	
169. Suicide by drowning	...	...	...	...	...	
170. Suicide by firearms	...	...	...	...	...	
171. Suicide by cutting or stabbing instruments...	1	8	3	9	...	
172. Suicide by jumping from a height	...	...	...	...	...	
173. Suicide by crushing	...	...	...	...	...	
174. Other suicides	...	3	2	3	...	
175. Food poisoning...	...	39	...	39	...	
Botulism	...	1	...	1	...	

TABLE 1—(*cont.*)

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1928—(*cont.*)

Diseases.	* Remaining in hospital at end of 1927.	Yearly total.		† Total cases treated.	‡ Remaining in hospital at end of 1928.	Remarks.
		Admissions.	Deaths.			
XIV.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES—(*cont.*)						
176. Attacks of poisonous animals...	...	2	...	2	...	
Snake bite	1	31	4	32	3	
Insect bite	...	36	...	36	1	
177. Other accidental poisonings	...	52	9	52	...	
178. Burns (by fire)...	10	180	28	190	6	
179. Burns (other than by fire)	4	258	11	262	7	
180. Suffocation (accidental)	...	2	...	2	...	
181. Poisoning by gas (accidental)	...	...	...	...	...	
182. Drowning (accidental)...	...	...	...	...	...	
183. Wounds (by firearms, war excepted) ...	2	73	6	75	6	
184. Wounds (by cutting or stabbing instruments)	74	2,197	28	2,271	87	
185. Wounds (by fall)	81	1,801	12	1,882	50	
186. Wounds (in mines or quarries)	20	620	10	640	17	
187. Wounds (by machinery)	8	173	2	181	8	
188. Wounds (crushing, e.g., railway accidents, etc.)	15	197	5	212	12	
189. Injuries inflicted by animals, bites, kicks, etc.	6	110	...	116	7	
190. Wounds inflicted on active service	...	1	1	1	...	
191. Executions of civilians by belligerents ...	...	...	...	...	...	
192. A.—Over fatigue	...	4	...	4	...	
B.—Hunger or thirst	...	...	...	...	...	
193. Exposure to cold, frost bite, etc.	...	...	...	...	...	
194. Exposure to heat—						
Heatstroke	...	...	...	...	...	
Sunstroke	...	4	...	4	...	
195. Lightning stroke	...	1	...	1	...	
196. Electric shock	...	6	...	6	...	
197. Murder by firearms	...	...	...	...	...	
198. Murder by cutting or stabbing instruments	...	...	...	...	...	
199. Murder by other means	...	...	...	...	...	
200. Infanticide (murder of an infant under						
one year)	...	...	...	...	...	
201. A.—Dislocation	7	117	2	124	4	
B.—Sprain	6	304	...	310	3	
C.—Fracture	111	1,129	116	1,240	107	
202. Other external injuries	59	2,011	19	2,070	48	
203. Deaths by violence of unknown cause ...	...	...	...	...	...	
XV.—ILL-DEFINED DISEASES.						
204. Sudden death (cause unknown)	...	...	...	...	...	
205. A.—Diseases not already specified or ill-						
defined	249	5,427	19	5,676	303	
Ascites	2	56	14	58	1	
Œdema	1	8	...	9	...	
Asthenia	1	88	11	89	6	
Shock	...	23	10	23	...	
Hyperpyrexia...	1	290	3	291	...	
B.—Malingering	...	24	...	24	...	
XVI.—DISEASES, THE TOTAL OF WHICH HAVE						
NOT CAUSED 10 DEATHS	42	535	...	577	51	
1. Admitted with patients	48	1,809	...	1,857	50	
2. Pyrexia of uncertain origin	8	450	17	458	7	
3. Others including ulcers	300	5,150	58	5,450	329	
4. Vaccinia...	...	1	...	1	...	
Total ...	6,296	136,824	11,330	143,120	6,061	

TABLE 2.

MEDICAL STAFF ON 31st DECEMBER, 1928.

1	Principal Medical Officer
4	Senior Medical Officers
3	Chief Surgeons
1	Ophthalmologist
31	Medical Officers
1	Anaesthetist
15	Lady Medical Officers
2	Pharmaceutical Chemists
1	Personal Assistant to the Principal Medical Officer
11	Deputy Medical Officers
10	Assistant Medical Officers
41	Assistant Surgeons
1	Staff Assistant, European Hospital, Kuala Lumpur
24	Dressers, Special Grade
73	Dressers, Grade I
240	Dressers, Grade II
102	Dressers, Grade III
108	Dressers Probationers
5	Matrons, Grade I
9	Matrons, Grade II
54	European Sisters (including 6 Infant Welfare)
110	Asiatic Nurses
23	Native Midwives

HEALTH BRANCH.

1	Chief Health Officer
3	Senior Health Officers
19	Health Officers
1	Lady Medical Inspector of Schools
2	Chief Sanitary Inspectors
6	Assistant Surgeons
4	Senior Health Inspectors, Grade II
13	Health Inspectors, Grade I
10	Health Inspectors, Grade II
34	Probationer Health Inspectors

INSTITUTE FOR MEDICAL RESEARCH.

1	Director
1	Bacteriologist
1	Pathologist I
1	Pathologist II
1	Assistant Pathologist
1	Chief Chemist
3	Chemists
1	Entomologist
1	Malaria Research Officer
1	Research Student in Tropical Medicine
2	Assistant Surgeons
1	Librarian
1	Laboratory Assistant, Special Grade
1	Laboratory Assistant, Grade I
4	Laboratory Assistants, Grade II
7	Laboratory Assistants, Grade III
4	Probationers
1	Storekeeper

CENTRAL MENTAL HOSPITAL.

1 Medical Superintendent
1 Assistant Medical Superintendent
4 European Male Attendants
4 European Female Attendants
1 Senior Assistant Physician
1 Assistant Physician
1 Second Assistant Physician
1 Inspector
1 Assistant Inspector
1 Dresser, Grade I
1 Dresser, Grade II
3 Dressers, Grade III
1 Matron
1 Work Mistress
2 Nurses
1 Steward
1 Storekeeper

VETERINARY BRANCH.

7 Veterinary Surgeons
6 Assistant Veterinary Surgeons
9 Veterinary Inspectors
7 Veterinary Assistants
2 Veterinary Probationers

VENEREAL DISEASE BRANCH.

1 Specialist, Venereal Disease
7 Assistant Surgeons (3 attached to hospitals)
4 Nurses
1 Dresser, Grade II (Dispensary)
2 Dressers, Grade III (Laboratory)
1 Probationer

RADIOLOGICAL BRANCH.

1 Radiologist
1 Second Radiologist
1 X-Ray Assistant, Grade II
1 X-Ray Assistant, Grade III
2 X-Ray Assistant Probationers

Appendix A.

ANNUAL REPORT OF THE INSTITUTE FOR MEDICAL RESEARCH FOR THE YEAR 1928.

INSTITUTE FOR MEDICAL RESEARCH—STAFF 1928.

Director, A. N. Kingsbury, B.SC., M.D., B.S. (Lond.), M.R.C.S., L.R.C.P. (Eng.), D.P.H., D.T.M. AND H. (Eng.).

Research Student, R. L. Lewthwaite, M.A., B.M., B.CH. (Oxon.), M.R.C.S., L.R.C.P. (Eng.).

Senior Assistant, S. Suppiah.

Bacteriological Division.

Bacteriologist, G. V. Allen, M.D., B.CH., B.A.O. (Belf.), D.T.M. AND H. (Eng.).

Pathologist II (Ag.), C. R. Amies, M.B., B.S. (Lond.), M.R.C.S., L.R.C.P., D.T.M. AND H. (Eng.).

Assistant Pathologist, J. E. Lesslar, D.M.C. (Madras).

Senior Assistant, M. Kandiah.

Chemical Division.

Chief Chemist, R. W. Blair, A.R.C.SC.I., F.I.C.

Chemist, H. Marsden (until August, 1928), B.SC. (Manch.), A.I.C.

Chemist, J. Shelton, F.I.C.

Chemist, F. E. Byron, PH.D., B.SC. (Liv.), A.I.C.

Chemist, I. A. Simpson, PH.D., B.SC. (Liv.), A.I.C.

Senior Assistant, S. Veerasingam.

Pathological Division and Pasteur Institute.

Pathologist, P. H. Martin, M.A., B.M. B.CH. (Oxon.), M.R.C.P. (Lond.), D.T.M. AND H. (Eng.).

Assistant Surgeon, K. Kanagarayer, L.M.S. (S'pore.), D.T.M. (Bengal).

Assistant Surgeon, S. R. Savoor, M.B., B.S. (Madras).

Senior Assistant, Lim Kon Yew.

Entomological Division.

Entomologist, B. A. R. Gater, M.A. (Cantab.), D.I.C. (Lond.).

Senior Assistant, P. D. Rajamoney.

Malaria Research Division.

Malaria Research Officer I (Ag.), R. Green, M.B., B.S. (Melb.).

Malaria Research Officer II, H. O. Hopkins, B.A. (Oxon.), M.R.C.S., L.R.C.P. (Eng.).

Senior Assistant, N. Thamboo.

Office.

Chief Clerk, R. Mailvaganam.

Library.

Librarian, V. Nagalingam.

ADMINISTRATION AND ORGANISATION.

The extension building was completed early in the year and was first occupied in March. This building is well arranged and spacious. It is now occupied by the Director, the Research Student, the Bacteriological Division, the Pathological Division and the Pasteur Institute. The Institute library is also housed in this building. It was found necessary to reroof, repair and repaint the old Institute building; this work took nearly five months to complete, resulting in considerable disorganisation. The Chemical, Entomological and Malaria Research Divisions are now housed in this building.

The Malaria Bureau, Bukit Nanas, was evacuated in March, and the staff was transferred to the Institute. The Bureau staff was rearranged to form two divisions, namely, Entomology and Malaria Research. The first now deals with the entomological side of malaria, and in addition with other insects of medical importance. The Malaria Research Division confines its attention to the study of malaria in the human host.

A reorganisation of the work of the Chemical Division took effect in August. In the past the Chemical Division, in addition to work of a medical nature, carried out examinations for nearly every department of Government. The number of non-medical examinations was increasing to such an extent that the division was unable to carry out any medical research work. The Chemical Division had become in effect a Government Analytical Laboratory, and it was believed that such a wide field of work was not consistent with the functions of a component division of an Institute devoted to medical research. A redistribution of chemical work was proposed which involved the creation of a new chemical laboratory in the Trade and Customs Department, and the transfer of certain work to the Chemical Laboratory of the Geological Department. This scheme was approved by Government, and Mr. H. Marsden was transferred to the Trade and Customs Department in August to take charge of the new laboratory, which will carry out the analyses required, including the examination of chandu, chandu dross, toddy and liquors. At the same time the Director of Geological Survey agreed to take over the examination of metals, oils, coals, etc., without any increase of his chemical staff. Mr. Marsden continued to work in this Institute, pending the completion of the Customs Laboratory which will be ready for occupation early next year. The result of this reorganisation is that the activities of the Chemical Division will in future be confined to work of medical importance, and it is hoped that there will now be time and staff available for important research work.

The library has been catalogued and rearranged during the year, and a card-index filing system has been introduced in the office. The store has been enlarged and completely reorganised. Lectures have been given weekly to the Junior Laboratory Assistants.

TROPICAL TYPHUS.

The investigation of tropical typhus, endemic on an oil-palm estate some twenty miles from Kuala Lumpur, has been continued by Dr. R. Lewthwaite. The occurrence in the years 1927-1928 of so large a proportion as eighty-five cases out of a total average labour force (excluding dependants) of seven hundred indicates the urgency that this disease has assumed, from the point of view not only of the welfare of the coolies but also of the economic welfare of the young oil-palm industry; although other oil-palm estates in the country appear, as yet, to be free from typhus.

Clinical and Laboratory Observations.

The clinical features of this disease have been fully described by Fletcher in previous publications from this Institute, and to them there is little to add. In reviewing the series of cases that have occurred the following observations are noteworthy; firstly, that no coolie contracted the disease a second time, one attack appearing to confer immunity; secondly, the mortality is low, in contra-distinction to that of the typhus of the western world; only six of the eighty-five patients died; and, thirdly, the blood of eighty-four patients, all of them field-workers, agglutinated the "K" strain of *Proteus X 19*, but not of the "W" strain; the blood of one case only agglutinated the "W" strain, but not the "K" strain, and this man had been employed solely in the estate factory as a barrel-maker.

We are grateful to Dr. G. C. McGregor, Visiting Medical Officer of the estate, and to Dr. J. P. Fitzpatrick, Medical Officer-in-charge of the District Hospital, Kuala Lumpur, for affording every facility for clinical observation of these cases.

Aetiology.

The aetiology of the disease has been investigated during the year along four different lines, statistical, animal inoculation, cultural, entomological.

STATISTICAL.

The disease is not seasonal. In every month of the year cases have occurred; and the figures of two years shew no consistent preponderance of cases in any of one month.

The nature of the work on which the coolies are employed does seem to bear a definite relation to the incidence of the disease. According to their work the coolies may be grouped as follows:

Group I.—Weeders and lallang cutters—the average daily number of whom is three hundred and fifty; two hundred and twenty of these work on areas planted with oil-palm, and one hundred and thirty on areas planted with rubber. The former coolies weed bare the ground beneath and around the palm trees for a radius of about six feet, and the strip of ground between the individual palm trees of each row. The latter coolies cut down the tall "lallang" grass and other undergrowth by slashing, work which necessitates their being in close proximity to the trees.

Group II.—Pruners and harvesters—the average daily number of whom is fifteen and thirty-two, respectively. The pruners hack from the trees and handle the dead male and female flowers, and the lower fronds, stacking them on the ground; thus preparing the way for the harvesters who deal similarly with the ripe fruits. Frequently the harvesters do their own pruning.

Group III.—Coolies who do not come into contact with the palm-trees, viz., Strippers—who, working in sheds, hack off the single palm-nuts from each bunch of ripe fruit; draining coolies; path and terrace cutters. The average daily number of this group is one hundred, fifty-five of whom work in oil-palm area.

Group IV.—Coolies who work only around the coolie lines, never in the field; such as sweepers, ayahs, watchmen, teachers, firewood coolies. The average daily number of this group is thirty-five.

Of the series of eighty-five cases of tropical typhus, seventy-eight belonged to Groups I and II, i.e., were coolies who worked either on the palm tree itself or in very close proximity to it. Of the remaining seven cases, two had been employed in a gang of eleven cutting a trolley line through palm-tree plantation, one had been digging drains around backward palm-trees, one was employed in the factory (referred to above) one was a water-carrier, one a draining coolie on the rubber area, and one of occupation the precise nature of which could not be determined.

No cases occurred from Group IV, a point of interest since many cattle live around the coolie lines. Cattle-drovers in the Federated Malay States contract the disease; three such—Sikhs—have been admitted to the District Hospital, Kuala Lumpur, during the last month. If cattle were the source of infection it would be reasonable to expect that cases would have occurred from Group IV.

Of the seventy-eight cases from Groups I and II, forty were weeders, thirty-two were pruners and harvesters, the remaining six being lallang cutters; and all of them worked on the oil-palm area. The daily average number of weeding and lallang coolies is, however, more than five times that of pruning and harvesting coolies. Further indication of the relatively higher incidence amongst pruners and harvesters was afforded by a sudden increase in the number of cases in May and June, 1928. In March one case only had occurred; in April one case, on the last day of the month; during May and the first week of June ten cases occurred. On enquiry from the estate manager it was learned that about the middle of April twelve coolies had been transferred from road-making to pruning, between April 30th and June 7th, ten of these cases contracted the disease, three fatally.

To summarize, the incidence of the disease is almost entirely confined to those who work on the oil-palm tree, to those who work beneath the trees, and to those who dig in the vicinity of the trees. Those working in and around the hutments, those who handle the ripe fruits in the stripping sheds. those employed on the routine draining of the estate, on the up-keep of the estate roads, or in the factory, rarely contract the disease; the only two to have done so being a water-carrier, and a factory hand who differed from all the other cases in that his blood agglutinated the "W" strain of *Proteus X 19*. Up to the present only one case, a draining coolie, has occurred amongst those working in the area planted with rubber. It would seem that cattle play no part in spreading the disease in this particular endemic; and that either the palm trees themselves, or the ground in the immediate vicinity, harbour the vector. The dead flowers lie at the base of the trees in dark and damp, and may well provide favourable conditions for a vector. Since the incidence is relatively much higher among pruners and harvesters, who handle these, than amongst weeders, the Entomologist of this Institute, Mr. B. A. R. Gater, decided first to examine the fauna of the dead flowers. An account of his preliminary investigations will be found elsewhere in this Report.

ANIMAL INOCULATION.

Attempts to infect laboratory animals with tropical typhus have continued. As early in the fever as was possible, usually the fifth to eighth day, the blood of each patient was inoculated intraperitoneally into two guinea-pigs and two rats.

Guinea-pigs.—Of some forty patients thus investigated, in three cases only did the inoculation cause infection of guinea-pigs. In these a rise of temperature of two to four degrees occurred on the eighth or ninth day, persisting until the sixteenth or seventeenth day.

Nicolle, working in Tunis, has found that in some cases guinea-pigs inoculated intraperitoneally with blood from a case of typhus shew no consequent rise of temperature, but that if these animals are killed towards the end of second week after inoculation, and emulsion of brain passed into more guinea-pigs, a rise of temperature characteristic of typhus occurs. In a case suspected of typhus, failure to obtain this febrile rise in a second passage animal he regards as very strong evidence that the fever is not typhus. This procedure was followed by us with a considerable number of guinea-pigs that showed no rise of temperature following inoculation of blood from cases of tropical typhus; but in no case did infection of the second passage animals result.

Anigstein, of Warsaw, reports that in many guinea-pigs inoculated with the blood of typhus patients a rise of temperature was obtained only in the ninth or tenth week. To discover if this obtained in tropical typhus the temperature of a number of inoculated guinea-pigs was taken daily for three months; but with negative results.

Mooser (1928) describes a striking sequel to the inoculation of male guinea-pigs with the blood of patients suffering from tabardillo, a severe form of typhus endemic in Mexico. Coincident with a rise of temperature on the eleventh day there occurs a marked reddening and swelling of the scrotum, attaining a maximum in twenty-four hours, and persisting usually for one or two days only, never for more than five. Macroscopically subcutaneous oedema and an intensely red tunica vaginalis are found. Histologically, scrotum, testis, and especially the tunica vaginalis shew extensive perivascular infiltration with lymphocytes, plasma cells, and mononuclears, nodes of these cells within the walls of the arteries and veins, and haemorrhages. Inoculation of further male guinea-pigs with an emulsion of the tunica parietalis or with oedema fluid from the scrotal sac invariably reproduces the fever and scrotal swelling. Sections and smears from the proliferated tunica vaginalis, when stained by Giemsa, reveal large numbers of minute diplo-bacilli within endothelial cells.

From some fifteen cases of tropical typhus, whose blood agglutinated the "K" strain of *Proteus X 19*, male guinea-pigs were inoculated with the blood drawn at the height of fever, without any resulting fever or scrotal swelling. No opportunity has yet offered for similar inoculations with blood from cases agglutinating the "W" strain.

Rats.—Intraperitoneal inoculations of blood from tropical typhus patients have, in the large majority of cases, caused a rise of temperature of two to three degrees, commencing on the ninth to eleventh day and persisting for a variable period of four to six days. Further inoculations of brain emulsion and of mixed spleen-kidney emulsion have succeeded in transmitting the virus to a second series of rats, in many cases to a third and fourth, and in one case to a seventh series. But beyond this the virus was invariably lost. Not every initial inoculation of typhus blood gave this rise of temperature; and, in some cases, of two rats inoculated at the same time with equal quantities of blood from the same patient, only one developed the fever.

Intraperitoneal inoculations into rats of the urine of typhus patients during early convalescence have recently been made, and in a minority of cases a febrile reaction followed, similar in all respects to that resulting from inoculations of blood.

Following the procedure adopted in the case of inoculated guinea-pigs, some of the non-reacting rats were observed over a period of ninety days. Others were killed towards the end of the second week, and emulsions of brain, spleen and kidney inoculated into a second series of rats. In no case did a rise of temperature result. Daily observation of all inoculated male rats revealed no evidence of scrotal swelling.

With regard to post-mortem findings, in almost every rat killed during the febrile reaction there have been found haemorrhages of the lung; in some cases these were multiple, small and punctuate; in others, few and extensive, and occasionally single. Enlargement of the spleen, and of the lymphatic glands of the groins and axilla, was sometimes found.

Histological examination shewed a congestion, in many cases extreme, of brain, liver, spleen and kidney. In the lung, in addition to congestion, a mild inflammation of the bronchi was evident; but broncho-pneumonia was rare.

CULTURAL FINDINGS.

Attempts to isolate from the blood *rickettsia* bodies or other causative organism were made in every case. Various kinds of media were used, viz., agar, enriched with glucose, with glucose and ascitic fluid, with ox blood, and with extract of bullock's heart, peptone and human serum; Loffler's medium; glucose broth. The following method, successful in the hands of Anigstein and others (Warsaw) in the case of typhus of the western world, was also employed; defibrinated blood is placed into broth and after three days' incubation a few drops of the grey layer (platelets and leucocytes) that lies on top of the blood are sown into human blood glucose agar. Small dew-drop colonies of rickettsia bodies should appear within forty-eight hours. Inoculation of blood from cases of tropical typhus by the above methods has proved unsuccessful.

ENTOMOLOGICAL FINDINGS.

This aspect is referred to in the report of the Entomologist, who has investigated the ectoparasites of rats and the acarine fauna of oil-palms. The mass of material examined has been very large, and the identification of groups of arthropods which have never been systematically studied in this country is being proceeded with. While no conclusions can be arrived at as yet, many valuable data have been established, and it has now been made possible to plan extended investigation along definite lines.

THE AGGLUTINABILITY OF THE "KINGSBURY" STRAIN OF *Proteus X 19*.

The Wright technique has been employed for several years in carrying out the Weil-Felix reaction in this Institute with very satisfactory results. The bacillary emulsion of the "Kingsbury" strain used in a 24-hour agar culture of *Proteus X 19* washed off with tap water. An attempt made to carry out Dreyer's agglutination technique using this bacillary emulsion resulted in complete failure, no agglutination taking place in any dilution, although with Wright's method a titre of 1 in 7,680 was obtained with the same serum against the "Kingsbury" strain. As a result of this failure numerous experiments were carried out with the object of discovering the factors controlling the agglutinability of the "Kingsbury" (K) strain, and secondly to compare the agglutinability of the "K" and "W" strains. A summary of the results of these experiments is given below; the full details of the experiments will be published elsewhere.

1. Type of agglutinable culture. *Proteus X 19* "K" was grown on agar, Lemco bouillon, fresh beef infusion bouillon, pancreas bouillon, and veal bouillon.

Bacillary emulsions prepared from agar cultures were invariably unsatisfactory whether killed or living. Occasionally some agglutination occurred, but never to the titre of the serum; as a rule the amount of agglutination was negligible.

Agglutinable cultures prepared by growing *Proteus X 19* "K" on various types of bouillon gave the best results. Sometimes one medium such as veal bouillon gave a more sensitive agglutinable culture than another but it was found, after numerous experiments, that in the long run cultures grown on fresh beef, veal, or Lemco bouillon gave equally good results.

Living cultures give definitely better results than killed. As a rule when a culture has been killed by the addition of formalin (0.1 per cent.) it is practically non-agglutinable although occasionally partial agglutination occurs, but never to a high titre.

2. The optimum temperature for agglutination was found to be 37°C. At 45°C. the cultures are moderately agglutinable but at 50°C. to 55°C. little or no agglutination takes place as a rule. This is due to the effect of heat on the culture rather than on the serum, because if a culture is heated for half an hour at 55°C. before adding it to the serum dilution it is non-agglutinable, whereas a serum heated to 55°C. for half an hour and mixed with an unheated culture will give a titre practically as high as the unheated serum, although the degree of agglutination has been slightly lessened.

3. The optimum incubation period in a water bath was found to be two hours. As a rule no further agglutination takes place after one hour.

4. Effect of pH on agglutination. Cultures were prepared by growing the "Kingsbury" strain on beef bouillon and diluting with saline (0.9 per cent.) and making three cultures of pH 6.0, pH 7.0, pH 8.0. These were found to be equally agglutinable.

5. Variations in agglutinability. When fresh broth cultures, suitably diluted, are used, there is a definite variation in the agglutinability of the daily subcultures, but this variation is never considerable. Sometimes a culture can be made more agglutinable by diluting it to the desired opacity with the same bouillon in which it was grown. Attempts to produce a killed agglutinable culture, which could be used from day to day, failed. When *Proteus X 19* was plated and separate colonies tested for agglutinability, there was found to be no variation between the different colonies.

6. The agglutinable culture adopted for use with Dreyer's technique as a result of these experiments is prepared as follows: A sufficient quantity of Lemco bouillon is inoculated from an agar culture of *Proteus X 19* "K" and incubated for about eighteen hours. The next morning this bouillon culture is diluted with saline (0.9 per cent.) to the correct opacity. The further technique is that of Dreyer, except that the tubes are incubated in a water bath at 37°C. for two hours. High titre agglutination of the O type is obtained as a rule.

MALARIA.

A considerable amount of work bearing on malaria was accomplished during the year by the Malaria Research (Appendix IV) and Entomological Divisions (Appendix V) for details of which the divisional reports should be consulted.

It was found that during the course of quinine treatment given for malaria in hospitals an increase in the number of sub-tertian gametocytes occurred and that after discharge the percentage of carriers infectious to the mosquito was higher than on admission. Thus when 42.3 per cent. of the patients examined were crescent carriers on admission, 64 per cent. were carriers on discharge.

A careful investigation into the effects of treatment with plasmoquine showed, however, that the addition of small quantities of this substance to the standard quinine treatment causes a rapid disappearance of crescents without any of the toxic symptoms sometimes associated with its use in full doses. The local importance of this is great, especially when large numbers have to be treated in districts where malaria is endemic, and the preliminary results should at least be tested as a public health measure on a large scale by the routine treatment of sub-tertian malaria by plasmoquine in addition to quinine over a considerable period.

A proprietary drug (Aseplene) which has been widely advertised throughout Malaya, particularly for the treatment of coolies on estates, was investigated and found to be useless for the treatment of malaria. In future the value of all proprietary drugs of this nature will be tested, since there is always a credulous section of the public willing to discard proved methods of treatment on the claims of advertisers. When a substance for the treatment of a serious disease fails to accomplish what is claimed for it, serious consequences may result if the public is not warned in time. The effects of dimeplasmin in the treatment of malaria, the relation of blood groups to infection, pancreatic efficiency and albuminuria in malaria were investigated during the year, and the report of the Malaria Research Division also contains some account of technical methods. From the entomological aspect a critical study of the specific identity of anophelines revealed the presence of at least one inaccuracy in identification, and of two varieties of one of our worst carriers. Correct discrimination between species and varieties is of first importance in work on malaria, especially on the experimental side. Experiments on the longevity of adult *A. maculatus* were made, and the contemplated work on the natural infective index of Malayan anophelines and the anophelinism of rice fields were in hand by the end of the year.

A number of substances were tested as possible larvicides and, among them, oils distilled from crude scrap and earth rubber proved to be efficient but had certain disadvantages in comparison with mineral oils. It was also considered that rubber oil could not be produced at a price to compare with oils now in use.

A summary of records of anopheline breeding-places, embracing the results of over 20,000 collections, was made and prepared for publication. This should prove of great value to all concerned in mosquito surveys, and one of the most important facts emphasised is that very few species appear to be really specific in the selection of breeding-places. Thus there is evidence produced that *A. maculatus* is capable of adapting itself to breeding-places vastly different from its natural habitat.

THE PRECIPITIN TEST IN THE DIAGNOSIS OF MALARIA.

Further precipitin tests in malaria have been carried out using the antigen described in last year's report, but with disappointing results. The antigen was prepared from two spleens heavily infected with *Plasmodium falciparum* in the following manner. The spleens were finely minced, freed from all fibrous strands and mixed with an equal amount of ether. This mixture was kept in an ice-chest for seven days with frequent shaking during the day. The ether was then filtered off and the spleen dried under an electric fan to remove all traces of ether. This was then extracted with boiling absolute alcohol for a quarter of an hour and the filtrate was discarded. It was again extracted with boiling 75 per cent. alcohol for one hour and the filtrate retained. This was left in an ice-chest for 2 hours, when a precipitate separated out. The supernatant fluid was discarded, the precipitate dried in the desiccator, and ground up with saline in the proportion of one gramme of precipitate to 20 c.cms. normal saline. This was filtered, and the filtrate was used as the antigen.

The test was performed by mixing 0.2 c.cm. serum, 0.2 c.cm. antigen and 0.05 saline and leaving in the incubator for one hour. It was then kept in an ice-chest for 24 hours and the readings taken.

Serums from 18 cases of sub-tertian, 9 cases of benign tertian, 2 cases of mixed sub-tertian and benign tertian and one case of quartan malaria were tested.

THE TREATMENT OF MALARIA WITH QUININE TROPOSAN.

This drug has been produced by Messrs. May and Baker and they kindly supplied a quantity for trial. Troposan is an isomer of stovarsol. The manufacturers claim that it is of low toxicity and is more active than stovarsol. Quinine troposan contains about 50 per cent. quinine and about 40 per cent. troposan (11 per cent. arsenic). It was supplied in tablet form, each weighing 0.25 gr. (1.9 grains quinine and 1.5 grains troposan).

Forty cases of malaria were treated with quinine troposan in the District Hospital, Kuala Lumpur. This group comprised eighteen cases infected with *P. vivax*, nineteen cases with *P. falciparum*, two cases with *P. malariae*, and one case with a mixed infection (*P. vivax* and *P. malariae*). Thirteen control cases were treated with quinine. Seven of these were infected with *P. vivax* and six with *P. falciparum*. Two or three tablets of quinine troposan were given three times a day orally. Parasite counts were made daily.

In the benign tertian cases the average number of parasites per 100 fields before treatment was 72, the average time taken for all parasites to disappear was 2.6 days.

In the 19 sub-tertian cases the average number of parasites per 100 fields before treatment was 94, the average time taken for all parasites to disappear was 3.1 days.

In the quartan cases the number of parasites per 100 fields was 33 and 88. The parasites disappeared in 4 and 6 days, respectively.

It was not possible to keep the patients in hospital for longer than 9-12 days and their further progress is unknown.

LEPTOSPIROSIS.

Dr. Lewthwaite has made the following report on some cases of this disease occurring during the year. Since Fletcher, in 1925, first proved the presence of leptospirosis in the Malay Peninsula some fifty cases have been recognised in the Federated Malay States. Until recently the incidence has been, with only two exceptions, entirely amongst the Asiatic population. During 1928, however, between the third week of May and the last week of September seven European patients admitted to the European Hospital, Kuala Lumpur, under the care of Dr. G. D. Gordon, were found to be suffering from this disease.

To facilitate comparison with the series of cases reported by Fletcher in the "Transactions of the Royal Society of Tropical Medicine and Hygiene", vol. xxi. No. 4 (Jan. 1928), the clinical features and laboratory findings are set out below in tabular form, as in the above publication.

ANALYSIS OF CLINICAL FEATURES.

Sudden onset	7
Prostration—	
Extreme	5
Considerable	2
Muscular Pain and Tenderness—	
Extreme	2
Considerable	4
Slight	1
Casts and a trace of albumin in urine	7
Redness of Eyes—	
Intense	4
Slight	2
Absent	1
Definite jaundice	1
Yellow conjunctivae only	0
Jaundice absent	6
Shotty glands	1
Pulse slow (below 56)	1

Epistaxis	0
Other haemorrhages	0
Rash—	
Erythematous	5
Marked malar flush (only)	1
Vomiting	2
Nausea (only)	3
Headache—	
Intense	6
Slight	1
Diplopia	1
Photophobia	5
Diarrhoea	2
Duration of Fever—	
9 days	5
10 days	1
12 days	1
Secondary rise of temperature	1

In all seven cases the muscular pain and tenderness were most acute in the muscles of the calf. In two of them, to touch the leg, or to move it in an attempt to elicit the knee-jerk, was to inflict agonizing pain. The jaundice noted in one patient developed on the sixth day of illness; and it was in this patient that the pulse rate fell below fifty-six, and that the secondary rise of temperature occurred. Commencing eleven days after the termination of an initial nine days' fever, this secondary rise lasted for eight days. Whether or not *Leptospira* reappeared in the blood could not be ascertained, as the patient was at the time at a distant hill-station. In view of the fact that previous to the occurrence of this series of cases the incidence of leptospirosis had been almost entirely amongst coolies from rubber estates and tin mines, the occupation and domicile of these European patients are of interest. Case I and VI were tin-miners from different mines, one being employed entirely on secretarial in-door work, the other on out-door work; both lived in the vicinity of the mines. Cases II and VII were assistants in a large general store in Kuala Lumpur; but lived at a distance from the town of three and seven miles, respectively. Cases III, IV and V were in-door workers in different offices in Kuala Lumpur, and resided with other Europeans in different parts of the town.

From one of three wells supplying water to the staff of the tin mine from which Case VI came, *Leptospira* were cultivated; on two occasions these were inoculated into guinea-pigs, and proved to be non-pathogenic. It is, perhaps, worthy of note that five of the seven patients had bathed at a certain bathing pool along the course of a river within a fortnight previous to the onset of fever; which may be mere coincidence, since this pool is a popular resort that attracts forty or fifty bathers weekly.

RESULTS OF LABORATORY EXAMINATION.

Case number.	Guinea-pig inoculation blood.	Day of inoculation.	Guinea-pig inoculation urine.	Day of inoculation.	Microscope urine.	Blood culture.		
						Day made.	Result.	Day on which Leptospira found.
1	N.D.	...	+ D.	10th	+	...	N.D.	...
2	0	7th	+ D.	14th	+	7th	+	9th
3	0	6th	0	11th	+	6th	+	20th
4	N.D.	...	+ D.	12th	+	...	N.D.	...
5	N.D.	...	0	12th	+	...	N.D.	...
6	*	4th	+ R.	18th	+	4th	0	...
7	N.D.	...	+ R.	17th	+	...	N.D.	...

The sign + denotes a positive result; O, a negative one; D, died; R, recovered. N.D., denotes not done—There being no opportunity to inoculate the blood during the first seven days of the disease.
* Guinea-pig died three days after inoculation; no jaundice, no fever.

The leptospiras from the two positive blood cultures were inoculated into guinea-pigs, and proved to be pathogenic. With regard to the inoculation of urine, this was performed every three or four days into two guinea-pigs from the ninth or tenth day of the disease onwards, where practicable. In any one case in which a positive result was obtained, not every pair inoculated gave this; hence the necessity for repetition. In one case, of two guinea-pigs inoculated with equal amounts of urine at the same time, one only developed the characteristic fever and jaundice.

TROPICAL ULCER.

A preliminary investigation of certain aspects of this condition was carried out during 1928. This included an analysis of the case sheets of 528 consecutive cases admitted to the District Hospital, Kuala Lumpur, several visits paid to places where ulcers were reported among the labour force, and numerous enquiries. In addition a bacteriological investigation was carried out, and a comparison of certain methods of treatment.

Epidemiology.

The condition appears to occur more frequently among Chinese mining coolies than any other section of the community. Children are rarely affected, the great majority, 99.3 per cent. of the cases analysed, occurring in persons over 15 years of age. With regard to occupation and social status practically all the cases occurred in those engaged in heavy manual labour. In the series analysed 69 per cent. of the Chinese were mining coolies, and the majority of the remainder were coolies employed on such work as road-making, gardening, wood cutting, grass cutting and weeding. Of the Tamils, 27 per cent. were unemployed coolies and the remainder, with a few exceptions, were manual labourers. The exceptions were a police constable, a cook, a clerk and a Mosquito Destruction Board Inspector. The body weight of the patients is slightly lower than normal, 68 per cent. of the Chinese and 86 per cent. of the Tamils weighed between 90 lbs. and 120 lbs. The site of the ulcers was constantly on the leg, ankle or foot. Some other disease was also present in many of the cases, 135 cases had either malarial parasites present in their blood or definitely enlarged spleens; ascariasis was common, and a number had ankylostomiasis, dysentery, bronchitis or beri-beri. A considerable degree of anaemia was present in a large number of the cases; 66 per cent. had haemoglobin percentage under 60 per cent. Half of the cases gave a history of definite injury, the other half stated that the ulcer started as a pimple or pustule. In the latter cases there was probably some abrasion of the skin prior to the pustule.

A visit was paid to a newly-opened estate on which a number of cases of tropical ulcer had occurred. There appeared to be several factors affecting their incidence. The labour force, which was entirely Tamil, was engaged in clearing jungle, a type of work for which Chinese labour is employed when possible as the work is regarded as too heavy for Tamil coolies. Owing to the nature of the work injuries to the legs were common. Malaria was prevalent, and the splenic index high. The diet was inadequate and the labour force was living largely on rice. Owing to the newness of the estate the coolies had not planted any food, and the distance from the nearest market or shops was too great to enable them to supplement their diet sufficiently often to render it more adequate.

Tropical ulcer appears to be almost confined to the coolie class, the unfit are more frequently attacked, it is believed that the most important predisposing cause is food deficiency, and investigations are being started to elucidate the relationship of nutrition to this condition.

Bacteriological Investigations of Tropical Ulcer.

A cultural examination of 60 tropical ulcers was made, using a technique similar to that employed by Sir Thomas Houston (Belfast) to isolate organisms from contaminated surfaces. The technique was as follows: The surface of the ulcer was scratched lightly with a sterile capillary tube until some blood oozed. This blood was allowed to run up the capillary tube until about 0.1 c.cm. had been collected. One end was sealed, and after clotting was completed the tube was centrifuged. It was then incubated at 37°C. for 18 hours, after which plates (blood agar) were spread from the clot and serum, and these were incubated anaerobically and aerobically, for 24 hours or longer. It was hoped by this method that the majority of the contaminating organisms would not survive, and that cultures might be obtained of organisms which had some relation to the condition. The most commonly isolated organism was a small haemolytic coccus, pleomorphic in arrangement, Gram positive, and in media containing whole blood producing a greenish discolouration. When injected subcutaneously or intracutaneously into the abdomen of guinea-pigs no reaction occurred. From the majority of cases diphtheroid organisms were obtained, occasionally in nearly pure culture, by this technique. Other organisms occurred much less frequently, *Pseudomonas aeruginosa* (Schroter) was isolated twice, organisms of the coliform group several times, and *Streptococcus faecalis* once. No organism was isolated anaerobically which had not been previously isolated aerobically. Pure cultures were obtained of the diphtheroid organisms present in twelve cases, and these were studied more extensively because it was found that they all invariably produced a small abscess when introduced either by the subcutaneous or intracuticular route into the abdominal skin of a guinea-pig. These abscesses were all precisely similar; 24 hours to 48 hours after injection a nodular infiltration developed surrounded by a small inflammatory zone, and about the fifth day an abscess developed usually about the size of a large pea, the pus being creamy white in colour and curdlike in character. Pure cultures of the diphtheroid were usually obtained from this pus. Passage of these diphtheroids from guinea-pig to guinea-pig did not result in any increase in virulence.

The diphtheroids were examined morphologically and culturally. Morphologically the strains were very similar when stained with toluidin blue, some differing slightly in shape but this varied with subculturing. All showed definite metachromatic beading and differentiation on morphological grounds was difficult or impossible.

Culturally the 12 strains fell into ten groups according to their fermentation of carbohydrates. Two proved to be true *C. diphtheriae*. Of the remaining ten strains, eight fitted into six of the groups given as representative in the Medical Research Council Publication "Diphtheria" on page 426. The remaining two strains did not agree culturally with any of the eleven groups. Two of the strains were identical with group XI, two with group VIII except that no pigment was produced. One strain of each of the groups I, II, IV and VI was obtained, except that with the strains otherwise corresponding to groups IV and VI, no pigment was produced.

Of the two strains which did not fit into this classification one produced acid in glucose and dextrin, but no change in lactose, mannite, maltose, saccharose or galactose. The second fermented glucose, maltose and dextrin with the formation of acid but no change in lactose, mannite, saccharose or galactose. Neither produced pigment. For all the strains the fermentation reactions were repeated several times.

TREATMENT.

The following preparations were tried on fifty cases of tropical ulcers—eusol, a thin wood-oil, and a crude wood-alcohol, hypertonic saline, and hydrogen peroxide combined with sodium iodide internally.

The method of dressing was as follows: In the morning, the discharges were swabbed off with pledgets of cotton wool soaked in saline and three to four layers of gauze cut to the size of the ulcer were placed over the area which was then soaked with the solution selected. Eusol, hydrogen peroxide or hypertonic saline were frequently dropped on to keep the dressings moist; the wood oil was applied twice and crude wood alcohol four to five times during the day. The dressing was kept on till late in the afternoon when the ulcer was once more swabbed and fresh dressings applied and bandaged for the night.

Nineteen ulcers were treated with eusol which is the routine treatment employed at the District Hospital, Kuala Lumpur. It was perhaps slightly superior to other forms of local treatment, a clean granulating surface being comparatively quickly obtained. On the average an ulcer involving the skin and subcutaneous tissues took about five to seven days for all the sloughs and purulent discharges to disappear and to assume a healthy granulating surface. A much longer time was taken when the ulceration involved tendons and fascia.

The thin wood oil and crude wood alcohol were supplied by the Malayan Wood Distillation Co., Ltd. These products were tried because other workers have recommended the use of tar and tar products for the treatment of ulcers, secondly they are reputed locally to be of great value in the treatment of skin diseases, and thirdly because they were produced from local jungle woods and were cheap.

A preliminary analysis of the wood oil was carried out in the Chemical Division by Dr. I. A. Simpson with the following result:

	Per cent. by weight.
Water	1.9
Acid products boiling below 180°C.	0.1
Neutral products boiling below 180°C.	0.5
Phenols	3.0
Cresols (mixed)	16.7
Xylenols and higher monohydric phenols	2.5
Polyhydric phenols	4.0
Neutral oil	66.0
Loss (by difference) (Mainly tar)	5.3
Total ...	100.0

Ten cases were treated with this oil and it was found to be of definite value when applied as a dressing to cases in which the sloughing was not too extensive and the tendons or fascia not exposed.

In about eight days a clean granulating surface was produced. If the oil was continued after this stage, healing was retarded owing to the appearance of a whitish film of necrosed granulations. The after-treatment adopted was saline dressings or a zinc paste.

Seven ulcers were dressed with a crude wood alcohol. This caused the formation of a dry scab under which healing took place slowly.

These wood distillation products possess both antiseptic and stimulating properties, but if applied too freely or over too long a period they are liable to cause some necrosis of tissue. Neither appeared to possess any advantage over eusol in the majority of cases.

Five cases were treated with sodium iodide internally (gr. xv twice daily) and local applications of hydrogen peroxide, as recommended by Pfannenstill.*

Three ulcers improved with this treatment but no more rapidly than with any other. Two of the ulcers became progressively worse, eusol was substituted, and improvement took place at once.

It would appear from these and other observations carried out during the year, that if a sound surgical procedure is adopted in dressing tropical ulcers, and the patient well fed, it matters little what dressing is used.

LEPROSY.

The "Leprous Reaction".

A series of investigations on the condition occurring among lepers, known as "leprotic fever" or "the leprous reaction" were carried out by Dr. R. Green. The investigations included the frequency of occurrence, associated cutaneous and nerve lesions, predisposing factors, duration, benefit or otherwise to the patient, causation and treatment. From the results observed it was concluded that a wider recognition of the condition as a distinct phase of leprosy is desirable among those concerned with lepers, and that factors which predispose to the reaction should be kept in mind during treatment. Further, that a distinction in treatment should be made between patients regarding their stage of leprosy, with a view to anticipation and avoidance of reactions at undesirable stages, any beneficial effect of the reaction being apparently confined to lepers in Muir's third stage. It was considered that the leprous reaction appears to have its origin as an acquired condition of allergy towards *M. leprae* already in the tissues. This condition combined with the possible multiplication and dissemination of *M. leprae* at reaction periods probably accounts for all the subsequent manifestations of the reaction. Of the various methods of treatment used, the most successful results were obtained by desensitizing the patient with adrenalin or preferably ephedrine.

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* Brit. Med. Jour. vol. I, 1925, p. 732.

THE RUBINO REACTION FOR THE DIAGNOSIS OF LEPROSY.

In 1926 Rubino described a diagnostic procedure for cases of leprosy which was an elaboration of the fact that the erythrocyte sedimentation rate is markedly increased in active cases of this disease. Marchoux and Caro (1928) applied this test to a large series of cases and reported very favourable results from it. In view of these reports it was decided to examine a number of lepers for this reaction and a summary of the results so far obtained is given.

Briefly the reaction depends upon the property possessed by leprous sera of causing the rapid sedimentation of a specially prepared suspension of formalinised sheep's red cells. For a full description the original papers should be consulted. Several modifications have been introduced in this laboratory and the test as now performed is as follows:

1. The sheep cell suspension. Sheep's blood is obtained from the abattoir and defibrinated in the usual manner. The red cells are completely freed from serum by repeated washing with saline followed by centrifugalisation. To these cells is then added a 6.0 per cent. solution of formaldehyde, the reaction of which has previously been brought to a pH of 7.4 by the addition of an alkali. This is allowed to stand at room temperature for 24 hours. The red cells are then repeatedly washed in saline as before, and finally the original volume of blood is made up by the addition of physiological saline. This suspension was found to remain unaltered for many weeks if kept in the ice chest.

For the actual test, 0.2 c.cm. of this suspension is added to 1.0 c.cm. of fresh serum taken from a suspected case of leprosy. The mixture is shaken, placed in an incubator at 37°C. and examined at half-hour intervals. If the reaction is positive complete sedimentation of the formalinised red cells takes place within an hour.

So far, 72 leprous serums have been examined by this test, together with an equal number of serums taken at random from specimens sent for Wassermann reaction. These latter acted as controls.

The reaction was positive in all the cases of active leprosy included in the series. It gave negative results in cases of long standing nerve leprosy in whom the infection has obviously burnt itself out. In 72 serums obtained from non-lepers the reaction was negative in all except one case which gave a slightly positive result. It appears therefore that this test may give assistance in the diagnosis and also in the prognosis of leprosy.

When a larger series of cases has been collected it is intended to publish the results in detail.

THE KAHN AND WASSERMANN TESTS IN LEPROSY.

Routine examination by these two methods is now done on all lepers admitted to the Federal Leper Settlement, Kuala Lumpur. The results so far obtained may be of interest.

RESULT OF 80 WASSERMANN REACTIONS ON LEPERS.

W.R.	result	+ +	12	cases
,,	,,	+ ±	5	,,
,,	,,	+	7	,,
,,	,,	±	4	,,
,,	,,	$\underline{\pm}$	3	,,
,,	,,	anticomplementary	4	,,
,,	,,	negative	45	,,

The Kahn reaction agreed with these findings in all except six cases (excluding the four anticomplementary serums). Five of these gave a negative Kahn reaction with a one plus Wassermann reaction, the discrepancy persisting on repetition of the test. None of these five cases showed clinical signs of syphilis, and it was therefore assumed that the Kahn test was more reliable in this instance. The sixth gave a $\underline{\pm}$ Wassermann reaction and a three plus Kahn reaction. There were clinical signs of syphilis in this patient and his condition improved considerably after a course of antisyphilitic treatment. At the conclusion of this both tests gave a negative result,

"ALEPOL" TREATMENT OF LEPROSY.

Through the kindness of the British Empire Leprosy Relief Association supplies of the preparation known as "Alepol" have been available, and a number of cases have been given this treatment. The intramuscular route is employed owing to the objections which the inmates make to intravenous medication. The results so far obtained have been excellent and are given in the following table:

No. of injections given.	No. of patients.	Much improved.	Improved.	Slightly improved.	Stationary.	Worse.
35-40	4	0	2	1	0	1
30-35	3	0	1	1	1	0
25-30	6	1	0	5	0	0
20-25	2	0	1	1	0	0
15-20	1	0	1	0	0	0
10-15	7	2	1	3	1	0
Under 10	8	0	0	0	8	0
Totals	31	10%	55%		32%	3%

For comparison the results obtained from treatment with Muir's E.C.C.O. mixture, (Hydnocarpus wightiana ester with camphor and creosote dissolved in olive oil), are also given.

No. of injections given.	No. of patients.	Much improved.	Improved.	Stationary.	Worse.
Over 40	11	7	3	1	None
30-40	20	12	6	1	1
20-30	32	9	13	8	2
10-20	71	3	53	12	3
1-10	108	None	8	98	2
Totals	242	13%	34%	50%	3%

KRYSOLGAN TREATMENT OF LEPROSY.

This preparation which contains gold in a complex organic molecule has been favourably reported on by several workers. Through the courtesy of the manufacturers it is being given an extensive trial. Apparently it has been found to be particularly valuable in clearing up the ocular manifestations of leprosy and accordingly cases of this type have been chosen for trial.

A longer period of observation and treatment will be necessary before a definite opinion can be given on the value of this preparation. The results so far obtained have been promising.

Dr. C. R. Amies has carried out the leprosy investigations described above.

TUBERCULOSIS.

TREATMENT WITH SANOCRYSIN.

During 1927 eleven cases of tuberculosis, pulmonary and glandular, were treated with sanocrysin; the results and conclusions as far as treatment had progressed by the end of the year were given in the Annual Report of 1927.

The two patients reported last year as much improved maintained their increase in weight, their sputum remained free from tubercle bacilli, and clinical signs of disease in the lungs disappeared. X-ray examination shewed a great improvement of the condition of the lungs; and at their own urgent request the patients were discharged from hospital in February, 1928, after four months of treatment. One of them, a Tamil coolie, failed to return for re-examination. The other returned at monthly intervals; and, in June, was found to have relapsed. He was re-admitted to hospital, and a second course of sanocrysin treatment began. As a result of this, the relapse has been in some degree arrested; weight has increased, and cough diminished; but the sputum still contains tubercle bacilli, and the prospect of cure seems very remote.

Of the cases reported as slightly improved and as stationary, all ultimately relapsed in spite of continued treatment, which was eventually abandoned.

The case of tuberculous adenitis of the cervical glands was treated subsequently by both X-ray and ultraviolet-light therapy concurrently with the administration of sanocrysin. After an extended trial, no improvement being evident, the patient was discharged from hospital at his own request.

As far as can be judged from this small series of cases sanocrysin does seem to protract the course of the disease in the Asiatic patient, but offers little hope of cure.

ISOLATION OF AN ORGANISM SIMILAR TO *EBERTHELLA BELFASTIENSIS* (WILSON).

A male Chinese, aged 28, was admitted to the District Hospital, Kuala Lumpur, with a history of being ill for a week with fever and pain in the chest. On admission his temperature was 103.60°F., respirations 48, with signs of lobar pneumonia in the upper lobe of the left lung; the spleen was palpable and he had slight diarrhoea. His blood was examined for malaria on four successive days but no parasites were found; no parasites were found in the faeces. The Widal reaction was negative on the tenth day of illness. He died on the eleventh day of illness, and post-mortem the upper lobe of the left lung was in the stage of grey hepatization, the spleen was enlarged, soft, and slightly pigmented. There were several ulcers in the Peyer's patches of the last two feet of the ileum, oval in shape, and in size about 1.5 c.cm. by 1 cm. by 1 cm. Sections of one of the ulcers showed necrosis of the mucosa, and extensive infiltration of the submucosa with small round cells, a few plasma cells and a number of larger mononuclear cells of the macrophage type. A bacillus was isolated from this ulcer which had the following characteristics. It was Gram negative and motile; indol was not formed. Litmus milk became acid and a clot was formed in forty-eight hours. Acid was formed in lactose, glucose, mannite, maltose, saccharose, dextrin and galactose. A rabbit was injected intravenously with 0.5 c.cm. of a 24-hour broth culture, but remained apparently healthy until the eighteenth day when it became ill and died on the twentieth day. Post-mortem, multiple abscesses of the liver were found, but the organism recovered from these did not ferment lactose and formed indol and thus differed from the organism injected.

This organism agrees in its cultural characteristics with *Eberthella belfastiensis* "V" (Wilson). Bergey, in his "Manual of Determinative Bacteriology" (2nd Edition) describes the habitat of *E. belfastiensis* as "Intestinal canal in fever resembling typhoid", but I have been unable to find the authority for this statement in Wilson's paper.* It is of interest however that in the case recorded here the bacillus was isolated from a typhoid-like ulceration of the intestine. Unfortunately the identity of this organism with *E. belfastiensis* "V" (Wilson) could not be established because Professor Wilson's cultures were lost during the war.

INFECTIONS ASSOCIATED WITH *ALCALIGENES FAECALIS.*

During the year *Alcaligenes faecalis* (Castellani and Chalmers) was isolated in pure culture from two cases and it is believed that in each case it was responsible for the infection.

Case 1.—Dr. Ashby (Seremban), kindly supplied the following notes: An European male, aged 22, resident in Malaya for two years, was admitted to hospital with a history of eight days' fever accompanied by swelling in both groins. On admission he complained of headache, pains in the abdomen and back, and swellings in the groins. His complexion was muddy, he looked ill, and was mentally lethargic. The posterior cervical glands were enlarged but not tender. He complained of cough but no signs were found in the chest. The abdomen was flaccid, there was some tenderness to deep pressure. On deep palpation it was thought that enlarged mesentric glands could be felt. In the inguinal region the glands were markedly enlarged on each side, of an india-rubber-like consistency with some matting. They were slightly tender but the skin area over them was not reddened. There was no history of venereal disease, nor were any signs present. His temperature was normal on admission, but later in the day rose to 100°F. He presented the picture of a mild toxaemia. He continued to run an intermittent temperature for nearly five weeks which generally reached its maximum in the evening, the highest temperature occurring during the second week in hospital (the third week of illness) when for four nights his temperature was 101°F. The pulse was never rapid, the rate being usually between 80 and 90. During the third week in hospital the glands in the left inguinal region were injected with normal saline, which was withdrawn later, cultures were made from this fluid, and *Alcaligenes faecalis* was isolated in pure culture. The patient's serum agglutinated the *Alcaligenes faecalis* isolated to a titre of 1 in 60. The Widal, Weil-Felix and Wassermann reactions were all negative. The gland masses gradually softened and finally disappeared, the temperature became normal, and the general condition improved five weeks after the onset of symptoms. At no time was the patient very ill.

Case 2.—This patient (female) had had an attack of gonorrhoea three months before which was adequately treated. This was followed by a period of low fever occasionally accompanied by pain in the region of the left kidney and the patient lost one stone of weight. A pure culture of *Alcaligenes faecalis* was obtained from a catheter specimen of urine. A vaccine was prepared, and immediate improvement followed its administration. The improvement was maintained, and the patient regained her previous weight.

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* Jour. of Hygiene, VIII, 1908. 543.

CUTANEOUS BLASTOMYCOSIS.

The first reported cases of cutaneous blastomycosis in this country was recorded in the annual report of the Institute for 1924. During the year 1928, five cases were diagnosed, two in Chinese, two in Tamils and one in a northern Indian. Three cases were diagnosed by finding yeast-like cells in sections of tissues received for histological examination. Clinically one was a large elevated verrucoid growth on the back of the thigh with numerous epidermal abscesses. The other two were granulomatous ulcers on the leg and index finger. The main histological features were: (1) A mass of granulation tissue infiltrated with polymorpho-nuclear cells, connective tissue cells and showing a characteristic eosinophilic preponderance in one section, (2) Scattered through the tissue were yeast-like cells mostly spherical and a few pear-shaped, all showing a double contour. A large number of them showed single budding.

The fourth case was seen in the District Hospital, Kuala Lumpur. The lesions were distributed over both arms, both legs, front of chest, upper part of face and behind the ears. The patches on the arms consisted of small flat nodules covered with crusts arranged in an irregularly annular fashion. Scrapings from the nodules after the removal of crusts showed numerous yeast-like cells with similar characteristics to the above. One of the patches on the leg was very elevated and presented a verrucoid condition with a few abscesses and sinuses. This patch was of four months' duration; the other patches on the limbs appeared one after another about two months later. Those on the face and front of the chest were more recent and of fifteen days' duration. The lesions on the face appeared as numerous small cutaneous nodules, many of them arranged together in annular form. Pieces of tissue were excised from nodules at different sites and rubbed on to glass-slides, and stained by Gram's and Leishman's stains. The smears showed many globular yeast-like fungi, many of them showing single budding. All the patches cleared up in three weeks on treatment with potassium iodide in large doses, starting with sixty grains daily and increasing to ninety grain daily at the end of a week. Those on the face and chest disappeared leaving behind no traces of pre-existing lesions, but on the arms and legs a little discolouration remained.

The fifth case was that of a healthy adult male Chinese who gave a history that two months previously he had had a small papule on the left upper arm and another on the left leg which healed in a few days, leaving a small depressed scar. Around the site of this healed papule numerous nodules appeared, many of them ulcerating superficially. Similar nodules appeared on the nape of the neck and behind and on the ears. There was a moderate amount of itching but his general health was not affected. The lesions, during the six weeks before he presented himself for examination, showed no improvement with different local applications. They consisted of numerous papillomatous nodules many showing superficial ulceration. Some of them resembled early framboesiform lesions. Small pieces of the granulomatous nodules were clipped with scissors and smears made by rubbing on slides. Numerous yeast-like fungi were seen, all of them showing a double contour and a few with granules inside. All the cells were of spherical shape except the budding forms, which were pear-shaped. Sixty grains of potassium iodide were given daily, and the lesions cleared up in seven days, leaving hard, slightly elevated scars which were granular to the touch.

BERI-BERI.

An account is given in the report of the Chemical Division of the preparation of a Vitamin B extract absorbed on acid clay. This product has completely protected fowls from polyneuritis gallinarum, and has definite advantages over the liquid extract prepared in the past. It is hoped next year to prepare this extract in large quantities and issue it in tablet form for the prevention of beri-beri in areas where fresh supplies of food are unobtainable. Arrangements have been made with the Senior Medical Officer, Selangor, to have the tablets made by the Pharmaceutical Chemist, as soon as the necessary equipment has been obtained.

FAT CONTENT OF FAECES.

Dr. F. E. Byron has carried out a series of examinations of faeces using Cammidge's and Saxon's method in each case. The results of this comparison are given in Table VIII in the report of the Malaria Research Division.

SECONDARY ANAEMIAS.

An account is given in the report of the Pathologist (Appendix III) of the treatment of a number of cases of secondary anaemia with liver extract. Certain of these cases which failed to respond to ordinary remedies showed immediate improvement following the administration of liver extract. It is believed that in these cases, in addition to the causes of the secondary anaemia or supplementing them, there is another factor, probably nutritional and for which liver extract is specific, the action of the liver on the anaemia being indirect rather than direct.

ASCARIASIS.

An account of three fatal cases is given in the report of the Pathologist (Appendix III).

MELIOIDOSIS.

Three fatal cases of this disease occurred during the year and a report is given in Appendix III.

THE TREATMENT OF AMOEBIC DYSENTERY WITH BISTOVOL.

Messrs. May and Baker supplied a quantity of "Bistovol" and nine cases of amoebic dysentery were treated with this drug, one tablet (0.25 grm.) being given three times a day. In four cases there was a disappearance of *E. histolytica*, blood and mucus from the stools in four to six days. For one week from the day of disappearance of *E. histolytica* and for two days after discontinuing the drug, the stools were examined daily with negative results. In the fifth case *E. histolytica* was present till the tenth day of a course of fourteen days' treatment, but at the end of treatment the stools, after being free for six days, again showed *E. histolytica*. Of the remaining four cases, two relapsed within a week of cessation of a twelve days' course of treatment, and in the case of the other two patients, *E. histolytica* was present in the faeces for fifteen and twenty-four days after the commencement of treatment.

TREATMENT OF YAWS WITH "TROPOSAN" (MAY AND BAKER).

Messrs. May and Baker kindly supplied the Institute with a quantity of "Troposan". One case of secondary yaws and two of tertiary yaws were each given four tablets (each 0.25 grm.) by mouth daily for about three months commencing on the first week of January, 1928. In the case of secondary yaws, all the cutaneous lesions had disappeared in a fortnight. The tertiary cases cleared up in a month. A weekly Wassermann reaction was carried out. At the commencement of treatment the reaction in each case was strongly positive, but at the end of treatment the reaction was weakly positive in the two tertiary cases, and very weakly positive in the secondary case. Three months later two of the patients presented themselves for further tests (one tertiary and the secondary yaws) and both gave fully positive Wassermann reactions. The particulars are appended below :

Case I.—Male Tamil, age 28 years. Secondary yaws of two months duration. Troposan started on 5th January, 1928. Troposan completed on 28th March, 1928. Total dosage 84 grms.

,, II.—Male Malay, age 23 years. Tertiary yaws. (Foot Yaws). Treatment and dosage same as case I.

,, III.—Male Malay, age 21 years. Tertiary yaws. (Foot Yaws). Treatment and dosage same as above.

The effect of the treatment on the Wassermann reaction is tabulated below :

—	Commencement of treatment.	During treatment.									Three months after completion of treatment.
Dates	5/1/28	17/1	24/1	2/2	14/2	21/2	28/2	5/3	12/3	28/3	1/7/28
Case I	+ +	+ +	+ +	+ ±	+ ±	+ ±	+ ±	±	±	$\underline{\pm}$	+ +
Case II	+ +	+ ±	+ ±	+ ±	+ ±	+ ±	+ ±	+ ±	+	±	Not done
Case III	+ +	+ +	+ +	+ ±	+ ±	+ ±	+ ±	+	±	±	+ +

+ + = Very strong positive. + ± = Strong positive. + = Positive. ± = Weak positive.
$\underline{\pm}$ = Very weak positive.

PASTEUR INSTITUTE.

There was a great increase in the work of this division in 1928. The number of animal brains submitted for examination for rabies was 157 (83 in 1927), of which 85 were diagnosed as positive. The number of persons treated was 198 (123 in 1927) and the number of dogs vaccinated was 1981 (322 in 1927). A full account of the work of the Pasteur Institute is given in the report of the Pathologist (Appendix III).

PROPHYLACTIC VACCINES.

In the past a considerable sum has been expended by the Medical Department each year on the purchase of vaccines from England and elsewhere. This year the preparation of plague, cholera and typhoid-paratyphoid prophylactic vaccines was undertaken by the Bacteriological Division. By the end of the year a sufficient stock had been prepared to meet all demands (including a reserve stock of 75,000 doses of cholera vaccine), and a stock will be maintained large enough to render it unnecessary to purchase elsewhere in the future.

ROUTINE EXAMINATIONS.

There has been a very great increase this year in the number of laboratory examinations asked for by the hospital and health branches of the Medical Department. The greatest increase occurred in the number of serums sent for Wassermann reaction. This is due to the fact that early in the year nearly thirty new Medical and Health Officers were appointed, and an increase of staff such as this must inevitably be followed by an increased demand for laboratory examinations. The figures for the routine examinations (except Wassermann tests) will be found in the reports of the different divisions.

SEROLOGICAL TESTS FOR SYPHILIS.

Wassermann Reactions.

Early in the year it became obvious that the rapidly increasing number of specimens sent for the Wassermann reaction would necessitate a reorganisation of the methods hitherto employed. It was therefore decided to adopt the technique of Harrison (Medical Research Council, Special Report Series No. 14).

When as many as 250 serums have to be examined on one day the labour involved by a hand pipetting method is very great, with Harrison's technique this is avoided by the use of droppers for the different reagents, and this method has given most satisfactory results since its adoption in May.

Both antigen and haemolytic amboceptor are now being prepared at the Institute according to standard methods. A considerable saving of expense is thereby effected.

The following were the results obtained during the year:

Total number of specimens received	15,772	
Number which arrived in a condition unfit for examination	1,590	(10%)
Total number of tests performed	14,182	(90%)
Total number giving a positive reaction (+ +, + ±, +, ± or $\underline{\pm}$)	4,947	(34.8%)
Total number giving a negative reaction	8,484	(59.8%)
Number of anticomplementary serums	751	(5.4%)

It will be noted that many specimens arrive in a condition unfit for examination. This is due either to haemolysis or infection, or a combination of both. The long distance by rail over which many of the specimens have to be sent is doubtless the main cause of this, since most of the haemolysed or infected serums were sent from outlying stations. In certain districts a special messenger is employed to bring specimens from the hospitals. This method is giving good results and is far preferable to sending specimens by post. The number of spoilt specimens has steadily diminished during the year and it is hoped that further improvements in collection and despatch may diminish their number even more.

The Kahn Test.

In view of the recommendations of the 1928 Serological Conference, League of Nations Health Organisation, it was decided to adopt a flocculation test in addition to the Wassermann reaction for the routine diagnosis of syphilis. The Kahn test was selected and the technique employed was mainly that described by Kahn himself. Certain modifications have however been made, which are described below.

(i) Instead of measuring all the reagents by means of graduated pipettes, Donald's dropping pipettes are used as in the Wassermann reaction. A considerable saving of labour is thereby effected, while at the same time greater accuracy is obtained. The apparatus used is as follows:

A glass pipette is drawn to a fine point, the diameter of the outlet being such that, when held vertically, it will deliver, at a rate of one drop per second, a drop of Kahn antigen dilution the volume of which is 0.0125 c.cm. The correct size of these pipettes was originally found by trial and error, but is now gauged by a Starrett wire gauge, hole No. 54. Each pipette is tested before use. A very convenient method of regulating the rate of dropping is to fix the pipette vertically in a burette stand, and to slip a short length of stout rubber tubing over the upper end of the pipette. On the rubber tubing is affixed a screw clip so that the lumen of the former can be partly or wholly occluded. The rubber tubing below the clip acts in the manner of a rubber teat so that the pipette can readily be filled by immersing the lower end in the antigen dilution, while the rate of dropping is easily regulated by means of the screw clip.

The pipette having been thus filled, and the rate adjusted, it is only necessary to manipulate the rack holding the tubes so that one drop falls into the back row of tubes, two drops into the middle row, and four into the front row.

(ii) The serum to be tested is pipetted in the usual way.

(iii) For adding the final 0.5 c.cm. of saline to the tubes after shaking, a dropping pipette is again utilised. It was found that four drops of saline delivered at a rate of one drop per second from a dropping nozzle of 0.9 cm. outside diameter, measured 0.5 c.cm. This method is again quicker than measuring by hand. Using this technique, 3,383 serums were examined, and a Wassermann test was performed on each for comparison.

As a basis for comparison the following equivalents were taken:

Wassermann test (Medical Research Council nomenclature).		Kahn units.
++ or +±	=	++++ +++
+	=	++
±	=	+

The results obtained in this series are given below.

Total number of Kahn reactions performed	3,383
Total number showing agreement with Wassermann Test	3,214 (95.01%)
Total number showing disagreement	169 (4.99%)

It will be seen that the percentage of serums showing agreement with the Wassermann reaction findings is a little below the figure commonly quoted by those who have extensively used this test. In America an analysis of 500,000 Kahn tests showed that there was agreement with the Wassermann reaction in 97 per cent. of the cases. It must be pointed out that in this series many of the serums were to some extent haemolysed. They were included in order to estimate the value of the test under the conditions which obtain in a tropical country.

In the cases showing complete disagreement, both tests were if possible repeated on a fresh specimen of serum. Unfortunately, this was not obtainable in every case. It will therefore be sufficient to state that in most of the repeated cases the discrepancy persisted. The majority of the cases showing disagreement were latent or very long standing cases of syphilis. The Kahn test in these cases was the more sensitive.

STAFF CHANGES, 1928.

Dr. A. N. Kingsbury, the Director, proceeded on ten months leave on 13th April.

Dr. G. V. Allen, formerly Senior Bacteriologist, Kenya, was transferred as Bacteriologist on 25th November, 1927. Assumed duty on 26th January, and acted as Director from 13th April to the end of the year.

Mr. R. W. Blair, Chief Chemist, returned from leave on 21st May, 1928. He was absent from duty owing to illness from 16th September till 19th November.

Dr. P. H. Martin was appointed Pathologist and assumed duty on 26th October.

Mr. H. Marsden, Chemist, was transferred to the Trade and Customs Department as Chemist on 16th August.

Mr. J. Shelton, Chemist, proceeded on leave on June 20th and was absent for the remainder of the year.

Dr. R. Lewthwaite, Research Student, acted as Pathologist from 15th March till 28th September when he reverted to Research Student.

Dr. R. Green, Pathologist II, acted as Malaria Research Officer I, from 16th March till the end of the year.

Dr. C. R. Amies, Medical Officer, was seconded to the Institute for duty from 8th March.

Mr. P. V. Samuel, Probationer Laboratory Assistant, ceased to be employed on the termination of his agreement. Five Probationer Laboratory Assistants were appointed during the year.

PUBLICATIONS.

The following publications were issued from this Institute during the year :

(*a*) *Bulletins from the Institute for Medical Research*—

No. 1.—The Control and Treatment of Cholera in the Federated Malay States. A compilation from Reports.

No. 2.—Serum of Convalescent Cases in the Prophylaxis, Diagnosis, and Treatment of Measles, by A. Neave Kingsbury.

No. 3.—The Treatment of Malaria with Aseplene, by Richard Green.

(*b*) *Other Papers Published*—

(1) Recent work on Leptospirosis, Tsutsugamushi Disease, and Tropical Typhus in the Federated Malay States, by William Fletcher. *Trans. Royal Society Trop. Med. and Hygiene*, 1928. Vol. XXI, pp. 265-282.

(2) The Aetiology of Tsutsugamushi Disease and Tropical Typhus in the Federated Malay States, by William Fletcher, J. E. Lesslar and R. Lewthwaite. *Tran. Royal Soc. Tropical Medicine and Hygiene*, 1928. Vol. XXII, pp. 161-174.

(3) The Treatment of Asthma and Hay Fever with Ephedrine, by R. Green. *Malayan Medical Journal*, 1928. Vol. III, No. 2.

(4) Notes on a Case of Black Tongue, by R. Green. *Indian Medical Gazette*, 1928. Vol. LXIII, No. 7.

(5) Forensic Chemistry, by F. E. Byron. *Malayan Police Magazine*, 1928. Vol. I, No. 12.

(6) Cerebral Syphilis with a Description of Two Interesting Cases, by K. Kanagarayer. *Malayan Medical Journal*, 1928. Vol. III, No. 1.

(7) A Notes on Multiple Superficial Ulcers of the Small Intestine, by K. Kanagarayer. *Lancet*, 1928, Vol. II, p. 16.

(8) Some Complications of Ascariasis, by K. Kanagarayer. *Malayan Medical Journal*, 1928. Vol. III, No. 4.

ACKNOWLEDGMENTS.

Thanks are especially due to the Medical Officers in charge of the District Hospital, Kuala Lumpur, Drs. Fitzpatrick, O'Connor and Nevin, for their co-operation in enabling the staff of the Institute to have free access to the patients under their care.

G. V. ALLEN,
Acting Director, Institute for Medical Research.

Appendix I.

ANNUAL REPORT OF THE DIVISION OF BACTERIOLOGY FOR THE YEAR 1928.

1. The agglutinability of the "K" strain of *Proteus X 19* was investigated. A summary is given in the general report.

2. The identity and significance of the coliform organisms occurring in local water supplies have been investigated by J. E. Lesslar.

The following organisms have been isolated from the 84 samples examined, the figure in brackets refers to the number of times each was found.

E. neapolitanus. (27).
E. pseudocoloides. (12).
E. acidi lactici. (7).
E. vesiculosis. (5).
E. coli. (4).
E. communior. (3).
E. grunthali. (2).
Aerobacter cloacae. (8).
Aerobacter aerogenes. (1).
Serratia marcescens. (2).
Chromobacterium violaceum. (26).
Pseudomonas aeruginosa. (4).
Alcaligenes faecalis. (7).
Actinomyces nigra. (4).
Proteus asiaticus. (1).

In addition to the above list, 145 organisms have yet to be identified.

3. *Typing of B. dysenteriae Flexner.*—The typing of the local strains of *B. dysenteriae* Flexner was commenced during the year. Thirty strains isolated during the year from sporadic cases of dysentery have been examined. Agglutinations and absorptions have been carried out against the "V", "W", "X", "Y", "Z", "VZ" and "WX" strains, and in addition sera have been prepared against certain of the local strains and agglutination and absorption tests performed with these. This work is still incomplete, and a full account will be published later.

4. *Bacteriophage.*—Attempts were made to isolate bacteriophage from cases of bacillary dysentery. In all 20 cases were examined repeatedly, with the result that from five of these, strains of bacteriophage were obtained. These strains varied considerably in virulence, and in their action on different cultures of *B. dysenteriae* Flexner. There was no epidemic dysentery during the year, and no further trial of the value of bacteriophage in treatment has been made.

5. *Tropical ulcer.*—A bacteriological investigation of 60 cases of tropical ulcer was carried out, a summary of the results is given elsewhere in this report.

6. *Alcaligenes faecalis* was isolated from two patients and was believed to be the cause of the clinical condition. (*See* General Report).

7. An organism giving the cultural characters of *E. belfastiensis* V Wilson was isolated from ulcers in the ileum. Reference is made to this in the General Report.

8. *Leptospira in water.*—Four out of twelve samples of water examined contained leptospirae. Guinea-pigs were inoculated with negative results.

9. *Natural infection of a guinea-pig with B. whitmori.*—One guinea-pig received from Ipoh was seen to be very ill and was killed. Caseous nodules were found in the lower lobe of the right lung, and the spleen. Cultures were taken from the lung, spleen and heart and *B. whitmori* in pure culture was isolated.

10. *Prophylactic vaccines.*

	Quantity prepared.
Cholera vaccine	72,505 c.cms.
Plague vaccine	3,000 ,,
"T.A.B." vaccine	825 ,,
Staphylococcus (mixed and defatted)	300 ,,

The cholera vaccine was prepared by growing *V. cholerae* on alkaline agar enriched with pea flour. The agar was put up in bottles being rolled round the four sides, thus obtaining the maximum surface for growth.

ROUTINE EXAMINATIONS.

Total number of examinations carried out 8,986.

AMOEBIASIS.—

Faeces—

E. histolytica 15.

CHOLERA.—

Six cultures of faeces were received, all proved negative.

CYSTITIS.—

Bacteriological examination of urine—

E. coli 34.

DIPHTHERIA.—

Throat swabs—

Positive culture	96
Negative culture	1,129
Total	1,225

DYSENTERY (Bacillary).—

Faeces—

B. dysenteriae Flexner	51
Negative	228
Total	279

ENTERIC FEVERS.—

(*a*) Widal Reactions—	
Total number performed	1,478
B. typhosus positive	249
B. paratyphosus A positive	11
B. paratyphosus B positive	10
Negative	1,208
(*b*) Bacteriological examination of faeces—	
B. typhosus isolated	1
B. paratyphosus A isolated	1
Negative	212
(*c*) Blood culture—	
B. typhosus isolated	1
Negative	17
(*d*) Bacteriological examination of urine—	
Negative	136

(*e*) Hospital distribution of cases—

Perak 61.—(Kuala Kangsar 17; Teluk Anson 13; Ipoh 13; Taiping 11; Batu Gajah 5; Tapah 1; Kampar 1).

Selangor 23.—(Kuala Lumpur 13; Klang 4; Kuala Kubu 4; Kajang 1; Serendah 1).

Negri Sembilan 22.—(Seremban 10; Tampin 3; Jelebu 1; Kuala Pilah 8).

Pahang 22.—(Kuala Lipis 15; Bentong 2; Kuantan 2; Raub 1; Pekan 2).

Kedah 19.—(Kulim 14; Sungei Patani 1; Alor Star 2; Bedong 2).

GONORRHOEA.—

Urethral smears—

Positive	10
Negative	8

LEPROSY.—

Smears from nodules—

Positive	40
Negative	59

Nasal smears—

Positive	6
Negative	93

LEPTOSPIROSIS.—

Blood cultures—

Positive	5
Negative	6

Dark ground examination of urine—

Positive	7
Negative	22

MENINGITIS.—

Cultural examination of cerebro spinal fluid—

Meningococci	7
Pneumococci	5
B. tuberculosis	2
Negative	30
Total	44

Nasal swabs for meningococci—

Negative	35

PLAGUE.—

Human (gland)—

Positive	4	3 smears 1 g. pig inoculation.
Negative	1	

Rats.—All the rats examined were sent from Kinta district.

Spleen smears and culture—

Positive	1
Negative	68

TUBERCULOSIS.—

Sputum—

Positive	6
Negative	34

PUS AND BODY FLUIDS.—

Positive	2
Negative	12

URINE (Guinea-pig inoculation).—

Positive	2
Negative	3

TYPHUS (TROPICAL).

Serums from 83 cases gave a positive Weil-Felix reaction during the year. Seventy-two of these agglutinated *Proteus X 19* "K" strain and 11 agglutinated *Proteus X 19* "W" strain. Forty-four of the "K" cases came from the oil-palm estate where Dr. Lewthwaite is carrying out his investigations. The remainder came from the following hospitals:

Kuala Lumpur	10 cases
Kuala Lipis	4 ,,
Kuala Kangsar	3 ,,
Kuala Pilah	3 ,,
Klang	2 ,,
Teluk Anson	2 ,,
Seremban	2 ,,
Ipoh	1 ,,
Raub	1 ,,
	28 ,,

The eleven cases agglutinating the "W" strain came from the following hospitals:

Kuala Lumpur	4 cases
Kulim (Kedah)	2 ,,
Ipoh	1 ,,
Kuala Kubu	1 ,,
Kuala Lipis	1 ,,
Kuala Pilah	1 ,,
Elmina Estate	1 ,,

WEIL-FELIX REACTIONS—

Total number performed	2,778
,, positive	302
,, negative	2,476

VACCINES (Autogenous).—

Number prepared	97

WATER, FOOD AND MILK.

The bacteriological examination of water was undertaken by this division from 2nd April, 1928.

Samples were received from the following water supplies. The number of samples examined was eighty-four:

(1) Maxwell Hill Reservoir;
(2) Weld Hill Reservoir;
(3) Standpipe—Chemical Laboratory;
(4) Standpipe—Bacteriological Laboratory;
(5) Oyster bed, Kuala Kurau;
(6) Chlorinated water from 5;
(7) River water, Bagan Datoh;
(8) Kuala Kangsar catchment area, reservoir and town standpipe;
(9) Cold Storage Company, Kuala Lumpur.

The following table shows the number of samples received from each source, the average number of bacteria found and the number of times coliform organisms were isolated from certain volumes.

Supply number.	Source.	Number of samples received during the year.	Average number of bacteria per c.c. on ordinary agar at 37°C after 48 hours.	Average number of bacteria per c.c. on McConkey lactose peptone bile salt agar after 48 hours.	The volume of water from which B. coli was isolated.				
					Not detected in 10 c.cs.	10 c.cs.	5 c.cs.	1 cc.	0.1 cc.
1	Maxwell Hill Reservoir ...	38	67	20	11	12	10	5	0
2	Weld Hill Reservoir ...	23	41	11	0	2	3	18	0
3	Chemical Laboratory Tap	15	42	27	0	1	5	9	0
4	Bacteriological Room Tap	1	35	25	0	0	0	1	0
8	K. Kangsar Reservoir ...	3	32	7	0	0	0	2	1
9	Singapore Cold Storage Water Supply	1	74	28	0	0	0	1	0

In samples from sources 5, 6, 7, B. coli were found in 0.001 c.c.

One sample of ice was received from the Health Officer, Ipoh, and was reported as unsatisfactory, coliform organisms being present in 1 c.cm.

BACTERIOLOGICAL EXAMINATION OF OYSTERS.

At the request of the Director of Fisheries, 15 samples of oysters were examined. Each sample consisted of six oysters. Coliform organisms were isolated from 0.001 c.cm. in 13 samples. In two samples coliform organisms were present in 0.1 c.cm.

The oyster bed was situated at the junction of two streams, which were virtually sewers. Arrangements were being made for the purification of the oysters when the project was abandoned.

BACTERIOLOGICAL EXAMINATION OF MILK.

(Seven samples were examined.)

Source.	Number of samples received.	Amount of milk from which coliform organisms were isolated.				Organisms isolated.
		1 cc. undiluted.	1 cc. of 1-10.	1 cc. of 1-100.	1 cc. of 1-1,000.	
Selangor Dairy ...	1	...	...	1	...	Escherichia pseudocoloides
Singapore Cold Storage Co.	6	1	1	2	2	B. subtilis, B. alcaligenes faecalis, etc. (unidentified)

BACTERIOLOGICAL EXAMINATION OF TINNED MEATS.

Five samples of meat pastes were examined which were found to be bacteriologically sterile, but showed signs of chemical action having taken place between the tin and the contents.

MISCELLANEOUS EXAMINATIONS.

Blood smears, urine, sputum faeces, etc., 1,565.

APPENDIX II.

ANNUAL REPORT OF THE DIVISION OF CHEMISTRY FOR THE YEAR 1928.

Chemical examinations and investigations have been carried out for the following departments: Medical, Trade and Customs, Police, Railway, Public Works Department.

Since 16th August, 1928, chemical work for the Trade and Customs Department has been carried out by Mr. H. Marsden, B.SC., A.I.C., who was appointed Chemist, Trade and Customs Laboratory, on 16th August, 1928.

The chemical work for the Police Department, with the exception of the examination of exhibits for blood stains, deleterious drugs and toxicological exhibits, has been transferred since 1st September, 1928, to the Chemical Laboratory, Geological Survey Department, Batu Gajah.

The total number of samples examined in the course of the year was 9,831 as compared with 13,555 in the preceding year, a decrease of 3,724.

The decrease is due to the above-mentioned re-organization.

MEDICAL DEPARTMENT.

Chemical work is performed for the Medical Department in connexion with the Health Branch and the Hospital Branch. The samples submitted may be classified as follows:

(1) Milk;
(2) Water;
(3) Sewage effluents;
(4) Toddy;
(5) Exhibits for toxicological examinations;
(6) Miscellaneous articles.

(1) *Milk.*—The following standards are prescribed for milk in the rules of "The Sale of Food and Drugs Enactment, 1913."

(*a*) The quantity of milk fat present in milk must not be less than 3.25 per cent. of the total component parts thereof.

(*b*) The quantity of milk solids, other than milk fat, present in milk must not be less than 8.5 per cent. of the total component parts thereof.

To ascertain whether these provisions are complied with, officers of the Health Branch collect samples which are examined in this laboratory.

Six hundred and thirty samples of milk were examined. Of these, 11 (1.7 per cent.) contained less than 3.25 per cent. of milk fat, and 84 (13.3 per cent.) contained less than 8.5 per cent. of milk solids other than milk fat.

(2) *Water.*—The total number of chemical examinations of samples of water from existing or proposed supplies was 939 as compared with 818 in 1927.

Bacteriological examinations numbered twenty-six. The bacteriological examinations of samples of water for the first three months of the year were carried out by this division, and during the remaining period, by the Bacteriological Division, Institute for Medical Research, the details of examinations appear in the report of the Bacteriologist.

The raw and filtered waters from the two supplies which serve Kuala Lumpur were examined weekly.

The monthly averages of these examinations are shown in Table II, and the yearly averages for the last eight years in Tables III, IV, V and VI.

The raw waters are filtered through slow sand filters and the filtered waters passed into service reservoirs, the Maxwell's Hill Service reservoir being open and the Weld Hill Service reservoir covered. The averages differ slightly from those for the year 1927, although the rainfall for the year was lower.

Chemical examinations of the raw and filtered waters of the following supplies were carried out monthly: Bagan Datoh, Bagan Serai, Batu Gajah, Gopeng, Ipoh, Kajang, Kampar, Klang, Kuala Kangsar, Kuala Kubu, Kuala Lipis, Kuantan, Parit Buntar, Rawang, Seremban, Taiping, Tanjang Rambutan and Teluk Anson.

In a few cases, samples were not sent regularly. Two of the above-mentioned supplies are filtered through mechanical filters and nine through sand filters. As judged by the results of the chemical examinations, the raw waters filtered through mechanical filters, showed an improvement after treatment, and those filtered through sand filters showed in some cases a slight improvement after filtration.

The chlorination treatment of the Klang Water Supply has been discontinued since 1st August, 1928.

(3) *Sewage Effluents.*—Various types of sewage installations have been erected in Selangor. The resulting effluents from some of these installations have been examined. The examinations numbered 19, and the results in the majority of cases have failed to conform with the standards prescribed in the Report of the Royal Commission on Sewage Disposal.

(4) *Toddy.*—Eighty-one samples of toddy were examined to ascertain if they complied with the standards prescribed in the rules under "The Sale of Food and Drugs Enactment, 1913."

All the samples were satisfactory in this respect, but 22 samples gave indications of adulteration with water.

(5) *Toxicological Examinations.*—Twenty-two exhibits were submitted by officers of the Medical Department. Exhibits in connexion with cases of human poisoning numbered 19. Of these, five were human viscera, five faeces, and six urine.

In one case of Veronal poisoning—Veronal was isolated from the stomach, kidney, liver, spleen and urine in the following quantities, 2.38, 0.18, 1.68, 0.42 and 4.19 grains, respectively.

The viscera from three animals were examined with negative results.

(6) *Miscellaneous Exhibits.*—The total number of exihibits was 112. Forty-seven examinations of faeces of persons suffering from various types of malaria were carried out in connexion with an investigation by Dr. H. O. Hopkins on pancreatic efficiency tests in malaria. Each specimen of faeces was analysed by Cammidge's method and by Saxon's method. Some discussion has arisen as to the respective merits of these two methods. From the results of the analyses, it would appear that both methods furnish equally valuable results from a clinical point of view. Although Saxon's method, using wet faeces, is usually taken to give the more correct results, it is extremely doubtful whether either method gives strictly accurate results.

Other exhibits included samples of extract of rice polishings, tinctures, glycerine, medicines and liquids for poison.

VITAMIN B. EXTRACT.

The preparation of this extract was carried out throughout the year, and a sufficient supply was available to meet all demands.

The demands have been steady throughout the year, no special supply being required to alleviate distress due to floods, as was the case in 1927.

The total quantity of extract prepared was 26,618 fluid ounces, of which 23,129 fluid ounces were issued, as compared with 28,360 fluid ounces prepared and 27,680 fluid ounces issued in 1927. Three thousand, two hundred and sixty-eight fluid ounces were issued free and 19,861 fluid ounces sold at 25 cents per fluid ounce.

To overcome the difficulties of transporting large quantities of the liquid extract, experiments on the adsorption of vitamin B on acid clay have been carried out during the year with considerable success.

The method employed was based on that used with success by Messrs. Jansen and Donath in the Geneeskundig Laboratorium at Weltevreden, Java.

Sifted rice polishings (1,200 grammes) were extracted for six days with water (3,840 cubic centimetres), distilled arrack (960 cubic centimetres) and concentrated sulphuric acid (12 cubic centimetres) in glass cylinders of 5 litres capacity, the whole being well stirred from time to time. At the end of the six days, the liquid was filtered and the clear brown filtrate (4,000 cubic centimetres) shaken for three hours with acid clay (40 grammes). After filtering with suction, the acid clay was dried and found to have increased in weight by approximately ten per cent.

One gramme of this dried product, which was indistinguishable in appearance from the acid clay before treatment was considered to be equivalent in vitamin content to 27 grammes of rice polishings.

The beri-beri preventing properties of this product were tested by the Bacteriological Division by feeding to fowls. A suspension of the treated clay in distilled water (1 gramme of acid clay in 9 cubic centimetres of water) was made. Doses of this suspension were given daily over a period of eight weeks to nine cocks who were fed on a diet of autoclaved Siam rice No. 1. Three cocks received a dose of 1.9 cubic centimetres of the acid clay suspension, three received a dose of 2.2 cubic centimetres and the remaining three a dose of 2.5 cubic centimetres per diem.

Two of the birds in the first group (receiving 1.9 ccs.) showed a progressive loss in weight and one bird an increase in weight. None developed definite polyneuritis.

The three birds receiving 2.2 cubic centimetres per diem showed no appreciable loss in weight and remained healthy throughout the experiments.

One of the birds receiving 2.5 cubic centimetres per day died of enteritis, which had no relation to the experiments.

The other two birds remained healthy throughout the experiments.

A dose of 1.9 cubic centimetres of a 1 in 10 dilution of the acid clay product in distilled water, protects to a fair degree, but would appear to be a border line dose. A dose of 2.2 cubic centimetres should be protective.

The efficiency of adsorption is 85%—90%.

Two cocks which developed polyneuritis gallinarum on a diet of Bagan Serai rice No. 3, were treated with 2.2 ccs. of activated acid clay suspension daily. They improved steadily, but at the end of five weeks, although greatly better, had not completely recovered.

In July, a further series of experiments were carried out.

The rice polishings were extracted in the same way as before, but in this case the composition of the extracting liquid was as follows :

Water, 3,820 cc.;
Distilled arrack, 960 cc.;
Sulphuric acid (pure) 20 cc.;

that is, was slightly more acid.

The filtrate was shaken with 36 grammes of acid clay, giving a somewhat stronger product than in the previous experiment (1 gramme activated acid clay equipment to 30 grammes rice polishings).

A suspension (1 in 10) of this acid clay product in distilled water was fed to three batches of three cocks over a period of ten weeks, with the following results :

(1) Fowls fed on autoclaved Siam rice—1.7 ccs. of acid clay suspension daily. There was no loss in weight and no sign of polyneuritis gallinarum.

(2) Fowls fed on autoclaved Siam rice—2.0 ccs. of acid clay suspension daily. No sign of polyneuritis gallinarum.

(3) Fowls fed on autoclaved Siam rice—2.3 ccs. of acid clay suspension. No sign of polyneuritis gallinarum.

The efficiency of adsorption of vitamin B. on acid clay as shown by these experiments is at least 90 per cent.

It would appear therefore that a more complete extraction of the vitamin from the rice polishings is effected by slightly increasing the acidity of the extracting liquid.

The product thus obtained seems to have a higher protective effect.

Further experiments will be carried out in 1929, on a larger scale, and it is hoped in the near future to be able to replace the liquid product at present supplied, with the very much more convenient and relatively more powerful activated acid clay.

TRADE AND CUSTOMS DEPARTMENT.

The work for this department consisted mainly in the examination of samples in connexion with the assessment of duty, e.g., wines, potable spirits, liquors and denatured spirits, and samples of chandu and chandu dross, submitted by the Chandu Monopoly Department in connexion with the administration of the Chandu Enactment.

The notable decreases in the number of examinations for this department has been due to the transfer of work required by this department, to the Trade and Customs Laboratory.

Liquors.

In connexion with the assessment of duty, 62 samples of alcoholic liquors were tested for their spirit strength. In addition, one sample was examined for denaturants and was found to contain the necessary ingredients.

Toddy.

The acidity and alcoholic strength were determined in 1,080 samples.

In four samples, the acidity exceeded 0.8 per cent. expressed as acetic acid. Of the samples examined, 180 gave indications of adulteration with water, and the presence of starch was detected in four samples.

Special investigations for the detection of adulteration of toddy with water numbered 112.

CHANDU.

Two hundred and fifty-three samples of chandu and substances suspected to contain chandu were examined.

One hundred and six of these were found to be chandu of Government manufacture, 21 were illicit chandu, 7 re-prepared chandu, and 15 imitation chandu containing no opium.

The remaining exhibits included 76 pills, which were found to contain opium, 19 exhibits containing chandu dross, two tubes of chandu,. and one exhibit of adulterated chandu.

CHANDU DROSS.

The Chandu Monopoly Department purchase chandu dross from licensees at prices varying with the quality of the dross. The chandu dross is collected by the Chandu Monopoly Department and the examination of the dross is carried out by a Chemist from this laboratory.

The number of samples examined during the year was 5,266 as compared with 9,894 in 1927. Eighty-nine of these were found to be of poor quality, two adulterated, and one in which no chandu dross was detected.

MISCELLANEOUS EXHIBITS.

Twelve samples of turpentine were examined for the presence of mineral terpene which is liable to duty under the Petroleum Enactment.

Other substances included samples of ganja, substances for the presence of ganja, and samples of alum.

POLICE DEPARTMENT.

The number of exhibits received from officers of the Federated Malay States Police Department in connexion with proposed proceedings in the Courts was 1,125 as compared with 472 in 1927.

The exhibits received may be classified as follows:

(1) Coins and coining materials;
(2) Articles for blood stains;
(3) Exhibits for toxicological examination;
(4) Liquors;
(5) Deleterious drugs;
(6) Miscellaneous exhibits.

Since 1st September, 1928, the only exhibits accepted for analysis have been in connexion with toxicological examinations, deleterious drugs, and exhibits for blood stains.

(1) *Coins and coining materials.*—The number of exhibits examined was 822. Of these, 810 were counterfeit coins and 8 moulds. The other exhibits consisted of pieces of metal and instruments used in the manufacture of counterfeit coins.

(2) *Articles for blood stains.*—One hundred and sixty-eight exhibits in connexion with charges of murder were received from the Police authorities for examination for blood stains. Blood was found on 77 of these. The exhibits, which gave positive reactions for blood, were further examined by the precipitin test for human serum. Sixty-six stains gave the reaction for human serum, and one gave the reaction for buffalo serum.

(3) *Exhibits for toxicological examinations.*—Sixty-one exhibits were received for examination. Of these, 29 were human viscera, in eight of which poison was identified.

Morphine was found in three cases, alcohol two, acetic acid two, and strychnine one.

Other exhibits received in connexion with human poisoning included samples of stomach wash, vomited matter, urine, foodstuffs, and liquids.

The poisons identified were morphine (three exhibits) arsenic (two), mercuric chloride (one), potassium carbonate (one), sodium carbonate (one), sodium hydroxide (one), and broken glass in three powders.

(4) *Liquors.*—Seven alcoholic liquors were examined for alcoholic strength.

(5) *Deleterious drugs.*—Seven substances suspected to contain deleterious drugs specified in "The Deleterious Drugs Enactment, 1925," were examined with negative results.

(6) *Miscellaneous exhibits.*—Sixty exhibits were received for examination. Of these, three exhibits contained datura, three bamboo hairs, two acetic acid, one "ganja" and one potassium cyanide.

The other exhibits included three bombs, materials used in connexion with explosions, and Chinese crackers for black powder content.

OTHER DEPARTMENTS.

Samples submitted by the Federated Malay States Railway Department included nine samples of white metal. Two samples of water were also examined as to their suitability for use in boilers.

For the Ostreoculturist, eighty-five samples of water were examined.

For the Meteorological Observer, 12 samples of rain water were examined.

For the Public Works Department two fusible plugs were examined.

Thirteen samples of rice were examined for the Economic Botanist, Department of Agriculture, Federated Malay States, in connexion with an investigation of various strains of rice grown in different parts of the Federated Malay States. The analyses showed slight variations, especially of the ether soluble portion and of the proteins of the different rices.

In addition, two samples of pills were examined for presence of deleterious drugs for the State Surgeon, Kedah, and one sarong for blood stains for the Chief Police Officer, Kedah.

PRIVATE ANALYSIS.

Forty-four samples were received for examination. Included in this total, were samples of water, stout, wine, limestone, rice and one sample of human milk.

The fees for these examinations amounted to 1,330 dollars.

LEGAL PROCEEDINGS.

Members of the staff of the Chemical Division gave evidence in legal proceedings on fourteen occasions.

KUALA LUMPUR,
6th February, 1929.

R. W. BLAIR,
Chief Chemist, Institute for Medical Research, F.M.S.

TABLE I.

TOTAL NUMBER OF SAMPLES EXAMINED IN THE CHEMICAL LABORATORY DURING THE YEARS 1927 AND 1928.

	1927.	1928.
Medical Department—		
Milk, chemical	507	630
Water, chemical	818	939
Water, bacteriological	76	26
Sewage effluents	26	19
Toddy	157	81
Toxicological examinations	15	22
Miscellaneous	53	112
Trade and Customs Department—		
Liquors	58	63
Toddy	849	1,080
Chandu	426	253
Chandu dross	9,894	5,266
Deleterious drugs	7	—
Miscellaneous	34	35
Police Department—		
Coins and coining materials	175	822
Articles for blood stains	177	168
Toxicological examinations	37	61
Liquors	5	7
Deleterious drugs	3	7
Miscellaneous	75	60
Other Departments—		
Miscellaneous	87	126
Private Analyses—		
Water	67	46
Miscellaneous	9	8
Total	13,555	9,831

Table II.

KUALA LUMPUR WATER SUPPLY.

Chemical Averages for each month of the year 1928. Parts per 100,000 unless otherwise stated.

Month.	Impounding Reservoir. (Raw Water.)									Intake Works, Ampang. (Raw Water.)								
	Colour M. M. Brown.	pH	Ammoniacal nitrogen.	Albuminoid nitrogen.	Oxygen absorbed in 3 hrs.	Chlorine.	Total solids.	Oxidized nitrogen.	Rainfall in inches.	Colour M. M. Brown.	pH	Ammoniacal nitrogen.	Albuminoid nitrogen.	Oxygen absorbed in 3 hrs.	Chlorine.	Total solids.	Oxidized nitrogen.	Rainfall in inches.
January	24	6.8	.0004	.0087	.1331	.07	5.70	.002	6.56	23	6.9	.0004	.0090	.1479	.06	3.95	.002	4.85
February	26	6.9	.0003	.0083	.1291	.07	6.30	.002	3.57	27	7.0	.0005	.0116	.1649	.06	5.15	.000	6.17
March	29	6.6	.0006	.0095	.1190	.07	0.40	.000	4.54	38	6.9	.0035	.0110	.1724	.06	1.40	.000	4.00
April	34	6.5	.0007	.0104	.1400	.07	6.10	.002	11.67	52	6.6	.0007	.0192	.2746	.06	9.95	.004	9.69
May	34	6.6	.0004	.0105	.1568	.06	3.20	.002	7.67	37	6.8	.0005	.0095	.1906	.05	1.85	.000	3.66
June	35	6.5	.0005	.0103	.1480	.07	4.95	.002	3.39	36	6.6	.0008	.0094	.1540	.06	3.55	.006	4.67
July	33	6.5	.0008	.0090	.1440	.06	0.90	.002	5.18	52	6.6	.0011	.0294	.2750	.06	4.75	.004	5.43
August	28	6.6	.0006	.0082	.1390	.06	3.50	.000	4.71	34	6.5	.0006	.0095	.2780	.06	5.00	.000	6.77
September	26	6.5	.0005	.0079	.1560	.07	3.50	.002	7.08	34	6.7	.0003	.0065	.1810	.06	3.75	.000	7.84
October	25	6.7	.0002	.0105	.1520	.07	3.75	.002	15.56	31	6.7	.0002	.0055	.1790	.06	2.00	.002	15.31
November	39	6.5	.0008	.0102	.1730	.08	2.00	.002	11.12	33	6.6	.0000	.0046	.1620	.07	2.25	.006	9.94
December	39	6.5	.0001	.0110	.1640	.08	2.25	.004	6.78	46	6.5	.0002	.0066	.1920	.06	6.50	.010	9.13
Averages ...	31	6.6	.0005	.0095	.1462	.07	3.55	.002	7.32	37	6.7	.0007	.0110	.1976	.06	4.18	.003	7.29

Month.	Maxwell's Hill Reservoir. (Filtered Water.)								Weld Hill Reservoir. (Filtered Water.)							
	Colour M. M. Brown.	pH	Ammoniacal nitrogen.	Albuminoid nitrogen.	Oxygen absorbed in 3 hrs.	Chlorine.	Total solids.	Oxidized nitrogen.	Colour M. M. Brown.	pH	Ammoniacal nitrogen.	Albuminoid nitrogen.	Oxygen absorbed in 3 hrs.	Chlorine.	Total solids.	Oxidized nitrogen.
January	12	6.7	.0001	.0038	.0780	.07	2.95	.002	15	6.9	.0002	.0032	.0924	.06	3.40	.002
February	15	6.8	.0003	.0031	.0713	.07	6.95	.002	16	7.0	.0002	.0031	.0950	.06	4.75	.000
March	13	6.5	.0006	.0040	.0677	.07	3.15	.040	23	6.9	.0006	.0040	.0860	.06	3.90	.000
April	15	6.5	.0005	.0035	.0795	.07	1.30	.004	29	6.6	.0007	.0048	.1458	.07	3.50	.002
May	13	6.5	.0003	.0037	.0874	.06	1.20	.004	27	7.0	.0005	.0045	.1271	.05	3.65	.002
June	25	6.5	.0005	.0043	.0900	.07	3.95	.006	28	7.0	.0006	.0037	.1040	.06	4.65	.004
July	16	6.5	.0002	.0038	.0740	.06	0.40	.006	27	7.0	.0005	.0035	.1260	.06	4.65	.006
August	11	6.5	.0000	.0031	.0790	.06	3.00	.002	16	6.9	.0000	.0031	.1000	.05	3.50	.002
September	14	6.5	.0000	.0038	.0720	.06	3.25	.004	33	6.9	.0000	.0039	.1650	.06	4.75	.002
October	15	6.5	.0000	.0034	.0800	.07	3.25	.002	28	6.8	.0001	.0034	.1480	.06	1.75	.006
November	17	6.4	.0000	.0042	.0940	.07	1.75	.004	25	6.8	.0002	.0034	.1280	.07	1.00	.006
December	20	6.4	.0001	.0038	.0890	.07	1.25	.006	30	6.6	.0002	.0032	.1190	.07	2.75	.002
Averages ...	16	6.5	.0002	.0037	.0802	.07	2.70	.007	25	6.7	.0003	.0037	.1197	.06	3.52	.003

TABLE III.

AVERAGES, YEARS 1921-1928.

KUALA LUMPUR WATER SUPPLY: IMPOUNDING RESERVOIR AT AMPANG (RAW WATER) (HIGH LEVEL SUPPLY).

Parts per 100,000 (unless otherwise stated).

Years 1921-1928.	Ammoniacal nitrogen.	Albuminoid nitrogen.	Oxidized nitrogen.	Chlorides as chlorine.	Oxygen absorbed from permanganate 3 hours at 80° F.	Colour M.M. Brown in a 2-ft. tube.	Total solids.	Rainfall in inches.	Reaction pH
1921	.0006	.0124	.002	.06	.1619	...	4.0	...	...
1922	*.0009*	*.0131*	.003	.07	.1641	...	4.4	8.07	...
1923	.0007	.0116	.004	.07	*.1736*	22	4.0	8.41	...
1924	.0006	.0111	.002	.07	.1516	21	4.3	7.61	...
1925	.0005	.0102	.004	.07	.1484	26	*4.5*	*11.53*	7.5
1926	.0004	.0106	.003	.07	.1521	29	3.8	9.21	6.5
1927	.0005	.0107	.002	.07	.1341	*32*	*4.5*	10.32	6.9
1928	.0005	.0095	.002	.07	.1462	31	3.5	7.32	6.6
Averages for 8 years	.0006	.0112	.003	.07	.1540	27	4.1	8.92	6.9

TABLE IV.

AVERAGES, YEARS 1919-1928.

KUALA LUMPUR WATER SUPPLY: MAXWELL'S HILL (FILTERED WATER) (HIGH LEVEL SUPPLY).

Parts per 100,000 (unless otherwise stated).

Years 1919-1928.	Ammoniacal nitrogen.	Albuminoid nitrogen.	Oxidized nitrogen.	Chlorides as chlorine.	Oxygen absorbed from permanganate 3 hours at 80° F.	Colour M.M. Brown in a 2-ft. tube.	Total solids.	Reaction pH	Hardness (total).
1919	*.0010*	*.0094*	.010	*.08*	.0741	...	...	...	...
1920	.0005	.0074	.010	.06	.0834	...	*5.5*	...	*1.6*
1921	.0001	.0047	*.011*	.06	.0828	...	3.1	...	...
1922	.0001	.0047	.007	.07	.0835	...	3.4	...	...
1923	.0002	.0043	.006	.07	*.1049*	18	3.5	...	...
1924	.0008	.0055	.004	.06	.0897	17	3.6	...	...
1925	.0001	.0056	.005	.07	.0850	*19*	4.0	7.0	...
1926	.0000	.0041	.005	.07	.0768	16	3.2	6.0	0.1
1927	.0002	.0041	.004	.07	.0706	18	3.8	6.6	...
1928	.0002	.0037	.007	.07	.0802	16	2.7	6.5	0.4
Averages for 10 years	.0003	.0054	.007	.07	.0831	17	3.6	6.5	.7

The highest results are in italics.

TABLE V.

AVERAGES, YEARS 1921-1928.

KUALA LUMPUR WATER SUPPLY: AMPANG INTAKE WORKS (RAW WATER)

Parts per 100,000 (unless otherwise stated).

Years 1921–1928.	Ammoniacal nitrogen.	Albuminoid nitrogen.	Oxidized nitrogen.	Chlorides as chlorine.	Oxygen absorbed from permanganate 3 hours at 80°F.	Colour M.M. Brown in a 2-ft. tube.	Total solids.	Rainfall in inches.	Reaction pH
1921	.0005	.0055	.003	.06	.1555	...	*5.1*	...	...
1922	.0006	.0067	.004	.06	.1762	...	3.8	9.22	...
1923	*.0008*	.0071	005	.06	.1859	24	4.0	8.74	...
1924	*.0008*	.0051	.005	.05	.1562	24	4.3	8.28	...
1925	.0005	.0066	*.006*	.06	.1709	27	4.2	*12.07*	7.5
1926	.0003	.0071	.005	.06	.1764	30	3.8	9.88	6.5
1927	.0003	.0091	.004	.06	.1513	34	4.5	10.68	6.8
1928	.0007	*.0110*	.003	.06	*.1976*	*37*	4.2	7.29	6.7
Averages for 8 years	.0006	.0073	.004	.06	.1713	29	4.2	9.45	6.9

TABLE VI.

AVERAGES, YEARS 1919-1928.

KUALA LUMPUR WATER SUPPLY: WELD HILL (FILTERED WATER)

Parts per 100,000 (unless otherwise stated).

Years 1919–1928.	Ammoniacal nitrogen.	Albuminoid nitrogen.	Oxidized nitrogen.	Chlorides as chlorine.	Oxygen absorbed from permanganate 3 hours at 80°F.	Colour M.M. Brown in a 2-ft. tube.	Total solids.	Reaction pH	Hardness (total).
1919	*.0010*	*.0078*	*.010*	*.08*	.1113	...	...	...	...
1920	.0005	.0064	.009	.07	.1267	...	*6.0*	...	*1.6*
1921	.0002	.0044	.007	.06	.1206	...	4.4	...	...
1922	.0001	.0048	.005	.06	.1329	...	3.5	...	...
1923	.0002	.0046	.007	.06	*.1465*	22	3.6	...	...
1924	.0003	.0033	.006	.05	.1155	21	3.8	...	...
1925	.0001	.0044	.006	.06	.1054	*23*	4.0	8.0	...
1926	.0000	.0044	.005	.06	.1087	22	3.9	7.5	0.4
1927	.0001	.0035	.004	.06	.0842	22	3.9	7.1	...
1928	.0003	.0037	.003	.06	.1197	*25*	3.5	6.9	0.7
Averages for 10 years	.0003	.0047	.006	.06	.1172	23	4.1	7.4	0.9

The highest results are in italics.

Appendix III.

ANNUAL REPORT OF THE DIVISION OF PATHOLOGY FOR THE YEAR 1928.

PASTEUR TREATMENT.

During 1928 the method of vaccine preparation, and of administration of that vaccine, have been the same as that used previously. Carbolized vaccine, consisting of one per cent. nerve tissue in 0.5 per cent. carbol-saline is used in the treatment of human cases. The standard full course consisting of fourteen daily injections of five cubic centimeters each.

The same two strains of "fixed" virus have been used as before. The "C" strain obtained from the Pasteur Institute, Coonoor (originally from the Pasteur Institute, Paris) was in its 684th passage at the end of 1928. The "L" strain from Colombo was in its 324th passage at the end of 1928. Virulence has remained fixed, and each batch of vaccine, made up monthly, is a mixture of the two strains.

The two "Saigon" strains, given by Dr. Souchard, of the Pasteur Institute, Saigon, to Dr. R. Green in March, 1927, have only been passed a few times, owing to shortage of rabbits, and have not been used for vaccine production. The older strain, originally fixed some thirty years ago in Paris, has now completed 1,630 passages, while the younger strain, fixed from a local virus, isolated from a case of "street" rabies in Saigon, has completed 56 passages.

In accordance with recommendations of the International Rabies Conference held in Paris in 1927, which were circulated by the Medical Director, Health Organisation, League of Nations, a form of record has been started. These recommendations were approved by the Health Committee and by the Council of The League of Nations.

A copy of the "Results of Anti-Rabies Treatment" as sent in to Geneva is given below, together with some added figures of 1927 for comparison.

RESULTS OF ANTI-RABIES TREATMENT.

Patients Treated at Kuala Lumpur Institute during the Year 1928.

1. Method of treatment. Semple's.
   - (a) Schemes of dosage for light, medium and severe cases.—
     Light and medium cases ... ... 14 daily injections of 2 × 2.5 c.c.
     Severe cases ... ... 21 daily injections of 2 × 2.5 c.c.
   - (b) If a preservative such as glycerine or carbolic acid is used during what period of preservation is the vaccine considered to be efficient?

   Unused vaccine discarded when six months old.

	No. of cases.		Percentage of total.	No. of fatal cases.		Percentage mortality.	
	1927.	1928.	1928.	1927.	1928.	1927.	1928.
2. Statistics for all patients	70	146	—	0	1	Nil	0.68
3. Classification according to race—							
Europeans	19	41	28.08	-	-	—	—
Eurasians	5	9	6.16	-	-	—	—
Indians	33	64	43.84	-	-	—	—
Malays	3	6	4.11	-	-	—	—
Chinese	10	26	17.81	-	1	—	—
4. Classification according to variety of biting animal—							
Dog	—	92	100	-	1	—	—
Cat	—	—	—	-	-	—	—
Wolf	—	—	—	-	-	—	—
Jackal	—	—	—	-	-	—	—
Solipeds	—	—	—	-	-	—	—
Ruminants	—	—	—	-	-	—	—
Other animals	—	—	—	-	-	—	—
5. Evidence of rabies in biting animal—							
Category A	—	65	—	-	1	—	—
" B	—	6	—	-	-	—	—
" C	—	19	—	-	-	—	—
" D	—	2	—	-	-	—	—

	No. of cases, 1928.	Percentage of total, 1928.	No. of fatal cases, 1928.	Percentage of total, 1928.
6. Depth of lesion—				
Deep and superficial	55	—	–	—
No visible lesion	91	—	–	—
7. Interposition of clothing—				
On bare skin	27	49.1	–	—
Through clothing	28	50.9	1	(1 in 28) 3.57%
8. Position of bite—				
Head	1	1.82	–	—
Arm	22	40.00	–	—
Trunk	1	1.82	–	—
Leg	31	56.36	1	(1 in 31) 3.22%
Multiple bites to be classified according to site greatest danger, i.e., in order: head, arm, trunk, leg	—	—	–	—
9. Number of days after bite or contact when treatment was begun—				
0- 4	84	57.54	1	(1 in 84) 1.19%
5- 7	30	20.55	–	—
8-14	19	13.01	–	—
15-21	5	3.42	–	—
Over 21	8	5.48	–	—

10. Any further information or facts pertaining the above figures.

Paragraph 5.—

Category A=animal proved rabid by microscopic or biological test or both.

,, B = animal very probably rabid by veterinary or medical evidence—or by history.

,, C=animal untraced, diagnosis not substantiated.

,, D=suspicion of rabies subsequently rejected with certainty.

Paragraph 6.—

"No visible lesion 91." The figure 91, is the number of those actually bitten with no visible lesion, plus the number of those who came into contact with saliva, e.g., licked.

11. If paralytic accidents have been observed during the year, please give as detailed information as possible.

Nil.

12. Information regarding each fatal case of rabies. The entries to be made according to the foregoing system of classification (as examplified in the case detailed in the attached form).

One Chinese male, age 16 years—admitted to hospital after two days' illness and 72 days after bite, and 55 days after end of treatment. Complaining of fever, headache, giddiness, and general weakness, could talk. Very thirsty. Heart and lungs nothing abnormal reported. Spleen palpable.

Post-mortem report describes numerous petechiae over surface of heart and bases of lungs. Spleen enlarged.

Brain congested and oedematous. Brain sent to this Institute.

Smears and sections failed to demonstrate negri bodies. All three rabbits inoculated developed symptoms of rabies and sections showed the presence of negri bodies.

Method.	Scheme of treatment.	Duration of treatment	Race.	Biting animal.	Category.	Depth.
Semple's	Standard	14	Chinese age 16, male	Dog	A	?

Intervention of clothing.	Position of bite.	Lateness of arrival.	Interval bite until death.	Post-mortem.	Animal expt.
Through clothing	Left leg	3 days	73	N.B. not found	Rabbit inoculated, positive. N.B. present

The distribution of the cases treated at Kuala Lumpur is given in the Table I below. Besides these patients 50 persons attended for advice as to desirability of having treatment, and did not receive treatment.

TABLE I.

COMPLETED TREATMENT FOR THE YEAR 1928.

Nationality.	Selangor.	Perak.	Negri Sembilan.	Pahang.	Outside Malaya.	Malacca.	Total.
Europeans	34	...	4	...	1	2	41
Eurasians	9	...	...	...	...	...	9
Indians	46	5	10	...	...	1	62
Malays	2	1	2	...	...	...	5
Chinese	22	...	3	...	...	...	25
Completed course ...	111	6	19	...	1	3	142
INCOMPLETE TREATMENT FOR THE YEAR 1929.							
Europeans	...	...	...	...	...	...	...
Eurasians	...	...	...	...	...	...	...
Indians	1	...	...	...	...	...	...
Malays	1	...	...	...	...	...	...
Chinese	2	...	...	...	...	...	...
Course	4	...	...	...	...	...	4

Besides the one treated case which died of hydrophobia, Dr. E. E. Claxton reported an untreated case from the Banting District in which the history and clinical condition made an almost certainty of the diagnosis of hydrophobia. Unfortunately this was not able to be confirmed by laboratory technique. Dr. Claxton very kindly took the trouble to obtain further information to enclose with his own notes of the case, which he forwarded to the Institute.

Vaccine was sent out for administration outside Selangor as follows:

To Kedah	49 courses.
To Penang	7 ,,
To Singapore	1 course.

A summary of the results of the treatment is given below. The summary was made from the returns sent in under the Geneva scheme. Records are now being kept which was enable these returns to be filled up more completely in future together with follow-up of each patients history for the six months after treatment.

In 1927, 16 courses were given outside Selangor, compared with 52 during 1928.

SUMMARY OF RESULTS OF ANTI-RABIES TREATMENT.

Patients Treated with Vaccine Distributed from Kuala Lumpur Institute during the Year 1928.

1. Method of Treatment (2) Semple's.
   (*a*) Schemes of dosage—as at Kuala Lumpur.
   (*b*) Unused Vaccine destroyed when 6 months old.

	Penang.	Alor Star.	S. Patani.	Total.
2. Statistics for all patients ...	7	35	10	52
3. Classification according to race—				
Chinese	2	8	3	13
Indian	3	17	3	23
Malay	1	6	2	9
European	1	4	2	7
4. Classification according to biting animals—				
Dog	6	35	10	51
Monkey	1	—	—	1
5. Evidence of rabies in biting animal—				
Category A	1	23	6	—
,, B	1	4	—	—
,, C	5	5	4	—
,, D	—	3	—	—
6. Depth of lesion—				
Deep	4	—	6	—
Superficial	2	—	4	—
No visible lesion ...	1	—	—	—
7. Interposition of clothing—				
Bare skin ...	5	—	5	—
Through clothing	2	—	5	—
8. Position of bite—				
Head	—	—	—	—
Arm	3	—	3	—
Trunk	2	—	—	—
Leg	2	—	7	—
9. Number of days after bite when treatment was begun—				
0— 4 ...	3	—	—	—
5— 7 ...	1	—	5	—
8—14 ...	1	—	5	—
15—21 ...	2	—	—	—
10. Further information given	Nil.	Nil.	Nil.	—
11. Steps taken regarding following up history ...	One case only European, has reported. No ill effects six months after treatment ...		—	—
12. Paralytic accidents	Nil.	Nil.	Nil.	—
13. Fatal cases ...	Nil.	Nil.	Nil.	—

It will be seen from the tables given above that the number of persons treated during 1928 was more than double the number treated in 1927.

One patient died of hydrophobia after treatment. No cause of this failure to protect is known. Being the only fatality, statistically the records obtained are satisfactory compared with those of other Institutes.

It has not been possible to carry-out any research on the "Rabicidal action of serum of man and animals during and after immunisation" nor on the "Plurality of strains of fixed virus." A circularized memorandum was received on these subjects from the Medical Director, Health Organisation, League of Nations, suggesting the lines of research under Resolution 11. 6 of the International Rabies Conference held in Paris in 1927.

OCCURRENCE OF RABIES IN ANIMALS.

Animal brains to a total number of 157 were submitted for examination. This was a great increase over the 83 submitted in 1927.

Table II shows the results of examination of dog's brains and the areas from which they were sent.

TABLE II.

	Brains of Dogs.	
	Positive.	Negative.
Selangor	50	41
Negri Sembilan	9	5
Perak	3	2
Malacca	1	3
Kedah	19	8
Penang	3	3
Singapore	0	1
Total	85	63

Excluded from the above table are the brains of: 1 cat (negative) from Selangor; of 4 monkeys (negative) 2 Selangor, 1 Negri Sembilan, and 1 Penang; 1 moosang from Singapore on which no report could be made because of putrefactive changes. Three dog's brains were in a similar condition, so that no report was possible.

PROPHYLACTIC INOCULATION OF DOGS.

The prophylactic vaccine consists of 20 parts nerve tissue, 40 parts glycerine, and 30 parts of 1.25 per cent carbol-saline. It is thus a killed vaccine. The recommended dose is a single injection of 6 c.cms., but with variations in size of the dogs, the dose has been varied between 4 and 8 c.cms.

The vaccine was distributed as follows:

Government Veterinary Surgeon, Selangor	9,036 c.cms.
,, ,, Perak South	4,560 ,,
,, ,, Negri Sembilan	660 ,,
State Veterinary Surgeon, Kedah	480 ,,

Table III shows the number of vaccinations made in each State compared with those made in 1927.

TABLE III.

	1927.	1928.
Selangor	—	1,244
Negri Sembilan	240	86
Perak	1	561
Singapore	1	—
Kedah	30	90
Province Wellesley	50	—
	322	1,981

The Government Veterinary Surgeon, Selangor, reports 1,244 vaccinations with three "apparent" failures of these two developed rabies within three or four weeks of vaccination, during which period they were not known to have been bitten. They were probably bitten and infected before the vaccination which was made too late to protect. The third case developed rabies about 4½ months after vaccination, and must be counted a failure.

The Government Veterinary Surgeon, Negri Sembilan, reports 86 dogs vaccinated, and that "all the contact or possible contact dogs round one rabies centre" were vaccinated, but none in connection with other areas. Three vaccinated dogs developed rabies, all within four weeks of vaccination. These three dogs are thought to have been bitten by one dog, later proved rabid, about three weeks prior to their vaccination. This tends to confirm the opinion that the canine vaccine is much more efficient if given before the bite, than after it, i.e., during the incubation period of rabies.

The Government Veterinary Surgeon, Perak South, reports no failures in 561 vaccinations, but that no further cases of rabies developed since vaccination was carried out.

The State Veterinary Surgeon, Kedah, reports 90 dogs and one cat vaccinated, with no known failures.

It was with difficulty that the persistently recurring demands for canine vaccine were met during the last two months of 1928. It is hoped in the future to build up a reserve of about 720 doses, which can be distributed as soon as a request is received.

A FATAL COMPLICATION OF ASCARIASIS.

During the year, three cases of multiple abscesses of liver caused by the migration of ascarides via the common bile-duct and intra-hepatic ducts were discovered at autopsy on three Tamil children. Death was due in each instance to generalised peritonitis following the rupture of one of the abscesses. Brief notes of the cases are appended below:

Case I.—A Tamil boy of ten years of age was admitted to the hospital on 1st June, 1928, from the Home for Decrepit Indians with a history of pain in the abdomen and vomiting round worms. He died on the nineteenth day after admission. In hospital he was given three santonin treatments. He was heavily infested with round worms and daily vomited out or passed per rectum, on an average, six to eight parasites. Towards the end he became considerably emaciated and complained of severe pain in the abdomen. At the autopsy, there was general peritonitis with faeculent fluid in the cavity. This was traced to the bursting of one of many foul-smelling abscesses in the liver. The common bile duct and the intrahepatic ducts were choked with round-worms. On the upper surface on the right lobe of liver, there were two big abscesses of the size of a lemon which contained wriggling coils of worms. Only a few round-worms were recovered from the intestines. Most of them had migrated upwards, and the oesophagus in its upper part was distended with a mass of worms. A few were wriggling out from the anterior nostrils. One had descended into the air passages and was found in the right bronchus. On the diaphragmatic surface of the right lung contiguous with one of the abscesses in the liver there was a superficial gangrenous patch which showed no communication with the bronchus in which the parasite was lodged.

Case II.—A Tamil boy was admitted to hospital on 20th August, 1928, in a moribund state and died within a few hours. At the autopsy the liver showed numerous small abscesses containing creamy pus admixed with bile. The common bile duct was packed tight with five round worms and two more were seen in the intrahepatic ducts. Forty-one parasites were recovered from the intestines.

Case III.—A Tamil boy of 2 years of age was admitted to hospital with pain in abdomen and died on the third day after admission. At the autopsy few round-worms in the intestines, few in the bile ducts numerous abscesses in liver, one ruptured, and general peritonitis were discovered.

MELIOIDOSIS.

Three cases of melioidosis were diagnosed post-mortem, two in adult male Chinese admitted to hospital from neighbouring tin mines and one in a Tamil admitted from the Home for Decrepit Indians. On admission to hospital they were all very ill with high temperature delirium and died 24, 60 and 70 hours after admission. At the autopsy numerous abscesses were found in the lungs, liver, spleen and kidneys in Case I, few large haemorrhagic abscesses in liver in Case II, and numerous small abscesses in lungs, liver and spleen in Case III. *B. whitmori* was isolated and identified from the abscesses in each case.

DEATHS DURING THE COURSE OF ANTI-SYPHILITIC TREATMENT.

Three cases came to post-mortem, of these two had given symptoms and signs suggesting the diagnosis of Encephalitis haemorrhagica, while in the third case syphilitic meningitis had been the provisional clinical diagnosis.

All three cases were adult males, aged 24, 30 and 37 years. The first two Tamils had primary sores and weak positive Wassermann reactions, becoming more strongly positive in the second case. The third case, aged 37, a Chinaman, had negative Wassermann reports on both blood and cerebro-spinal fluid.

The treatment had been Stabilarsan 0.3 grammes with 0.5 c.c. Bismostab. The patients had had 2, 3 and 4 injections—of the same size, respectively.

The intervals after the last injections were 4, 8 and 2 days, and death followed on the 6th, 2nd and 2nd days, respectively. Symptoms were fever, and those suggesting encephalitis, and included epiliptiform attacks in the first case; the second case showed the same state without fits, while the third had fever and drowsiness.

Post-mortem examinations showed a slight icteric tint of the skin, and the subcutaneous fat was yellow. The brain in each case was congested, and petechiae were seen in the second. Subpleural petechiae were seen in the second and third case, while the pericardium and heart also showed petechiae in two cases.

Kidneys showed marked degeneration of tubules and less severe of glomeruli. The livers of the second and third case showed marked central necrosis, with some haemorrhage, and no parasites. The liver of Case I was much the least severely damaged. The spleen was enlarged and congested in all three cases.

The post-mortem findings agreed well with Professor Turnbull's description of the tissues sent him from autopsies made on eight cases of death following injection of Salvarsan. (Medical Research Council, Special Report, Series No. 55, London, 1920.) In our cases a purpuric state seems to have been more prominent, but that may have been due to the extensive liver destruction.

No malarial parasites were found. Cultures made from one of the spleens was sterile. No leptospira nor spirochaetes were seen in the kidneys and liver of the third case, which were the only organs in which special search was made.

No arsenic was found in one of the kidneys, which was examined.

A recent batch of Stabilarsan has been tested at this Institute. The biological test, as recommended by the Medical Research Committee, Special Report Series No. 44 was carried out by Dr. Russell Amies. The mice used showed no illness at all. The percentage of arsenic was ascertained by the chemical division, and found to be correct.

The three cases occurred among a very large number of cases treated. There were many other patients treated with the same batches of Stabilarsan, with no ill-effect.

Dr. E. Byron, Chemical Division, kindly made the analysis of the Stabilarsan described above, and also tested the kidney submitted from post-mortem for arsenic.

Dr. E. R. C. Cooke, Specialist, Venereal Diseases, has been very kind in providing all the clinical information, and in discussion of the cases.

LIVER TREATMENT IN CASES OF SECONDARY ANAEMIA.

Following the preliminary investigation of the effect of liver treatment on the secondary anaemias associated with chronic malaria and ankylostomiasis, which was recorded in the Annual Report for 1927, during 1928 the observations were continued and more cases similarly investigated.

An extract of liver was made from the livers of sheep and goats. Bullock liver is proscribed by the religion to which many of the patients belong.

The method of preparation of the liver extract is as follows : The fresh liver is finely minced and is mixed with an equal amount of water by weight. This mixture is heated for two hours at 65°C and is then filtered through gauze and the filtrate is used.

The filtrate is prepared as required, sufficient being made to last four or five days. During this period it is kept in an ice-chest.

The method of administration used is as follows : The filtrate is given twice daily with meals in quantities of four ounces flavoured with orange juice or lime-squash.

On an average 1 lb. of liver yields 10 ozs. of extract, the patients therefore obtain the extract from 8/10 lb. or nearly 13 ounces of fresh liver per day. Under the above technique the cost per patient per day, of the liver alone, excluding cooking and labour is 57 cents.

The cases can be divided into three groups. Group 1 consisted of control cases. During observation they were parasite-free, and they were treated by the routine medicaments of iron, arsenic and quinine. These were given as: Tincture Ferri Perchloridi m X : Liquor Arsenici Hydrochloricus m III : Quininae Bihydrochloricum gr V : the above doses were given three times a day.

The cases of Group I had between 20 and 30 per cent. Haemoglobin at the commencement of the observation, and within three weeks had regained Haemoglobin, the estimations of Haemoglobin varying between 30 and 45 per cent. The Haemoglobin estimations were all made by the Tallquist scale. That the resulting figures are only accurate within moderately wide limits is well known, but for this preliminary investigation it is felt that the results obtained can be considered significant.

The cases of Group II were patients who were found to be stationary, as regards their haemoglobin percentages, in spite of being parasite-free, and in spite of receiving the standard treatment of Iron, Arsenic and Quinine. Some of these cases also received a proprietary preparation of Haemoglobin during the stationary period. The cases of this group were observed to be in their "stationary" state for periods varying between three and eight weeks. The standard treatment of Iron and Arsenic with Quinine, also any Haemoglobin preparation, were then stopped completely, and liver treatment substituted.

From an initial Haemoglobin percentage between 20 and 30 per cent. persisting throughout the "stationary" periods, the percentage began to rise and in three weeks lay between 35 and 52 per cent. Observations were continued in some of these cases till 70 per cent. and over of Haemoglobin was registered after six to nine weeks of liver treatment.

In one case of this group quinine treatment was continued while liver treatment was being exhibited, this was due to the shortness of the course of quinine previously given.

Group III consists of cases which were treated with liver from the time that they were admitted, being parasite free, or after specific treatment.

In this group there are two cases which required further specific treatment while they were taking liver. One case relapsed with fever and the "ring" forms of *P. falciparum* were found again, while the second case required two treatments with oil of Chenopodium at weekly intervals to deal with more hookworms and she showed the slowest rate of recovery of all the cases of the group.

In this group the initial Haemoglobin percentage varied between ten and 45 per cent. The gain of Haemoglobin appeared very similar to that seen in the cases of group 1, at the end of three weeks the percentage varied between 25 and 60 per cent. and was continued while the observations lasted, i.e., for eight weeks in the longest observed case.

No reticulocyte counts were made during this preliminary investigation, nor were the red cells measured in size. The Colour Index was low, except in a few cases, which at the commencement of treatment showed a Colour Index very slightly above unity. The difficulty of reading the Tallquist scale with an accuracy greater than ± 5 per cent. probably accounts for the apparently high colour indices estimated. All the cases except one with the improvement of their blood picture were found to have colour indices below unity.

Case No. 15, in Group III, required two doses of Oil of Chenopodium during the exhibition of liver extract, and she proved the only exception. When last observed the colour index was 1.2, but there was only 35 per cent. Haemoglobin at the time, five and a half weeks after starting liver treatment.

The cases were of both sexes, and were of Tamil, Chinese, and Sikh nationality. On the whole their wages were low, being of coolie class, but in three cases by their financial position the patients would be considered quite comfortably off.

DISCUSSION.

Group III—cases treated with liver extract from the start—showed a rate of recovery of Haemoglobin of about the same order as is shown by the group (Group I) treated by the standard drugs—Iron, Arsenic with Quinine, it is probable that any of these cases, from the time that they were freed of parasitic infection, would have recovered their haemoglobin gradually without any special treatment. But it is interesting that the rates of recovery of Haemoglobin appear so similar whether Iron and Arsenic with Quinine is given or liver extract.

Group II cases are those who were not regaining Haemoglobin properly, and who appeared in this respect to be in a stationary condition in spite of the standard treatment of Iron, Arsenic with Quinine. In these cases the substitution of liver extract for the withdrawn Iron, Arsenic and Quinine showed a quick and most marked response. The improvement estimated by the Haemoglobin figures was confirmed by the improved general condition, and by the gratitude of the patients themselves.

From a consideration of the cases observed it seems that one type of patient, after being rendered parasite-free can regenerate haemoglobin almost equally well whether he is given the standard treatment of iron, arsenic and quinine or liver extract. It is probable that such a patient would also regenerate haemoglobin, possibly at a slower rate, without treatment of his anaemia.

The series also indicates the presence of another type of patient, who in spite of being parasite-free, and in spite of receiving the standard treatment of iron, arsenic and quinine, and in spite of being in no worse position, as gauged by his Haemoglobin percentage, fails to respond to the standard treatment, but who can recuperate as soon as liver treatment is exhibited. Whether the recent or concurrent administration of iron and arsenic is necessary cannot be decided from our series of cases, but it would seem to be unlikely in view of the very good recoveries made by patients in Group III, to whom no such medicines were given while in hospital, nor are known to have been given before admission.

Owing to the poor diet of the classes from which most of the patients came, it may well be that an important factor impeding the recovery from the anaemia produced by chronic malaria or hookworm disease, is not so much the active disease itself, for which specific remedies are known, but a general condition of under nutrition, which liver treatment is able to improve.

PROVISIONAL CONCLUSION.

In addition to specific treatment of malaria or hookworms liver treatment seems especially indicated in those cases which fail to respond to the usual treatment of their anaemia with Iron and Arsenic with Quinine, and it is possible that it may succeed in the type of case which otherwise continues for months without improvement, and which finally ends fatally with some inter-current secondary infection.

Our thanks are due to the many kindnesses shown by Dr. Fitzpatrick and the staff of the District Hospital, Kuala Lumpur, by which the observations have been assisted so greatly.

AUTOPSIES.

During the year post-mortem examinations were carried out by the Institute staff on one-thousand and thirteen unclaimed bodies at the District Hospital, Kuala Lumpur. This number is exclusive of all medico-legal post-mortems which are conducted by the staff of the hospital. The main causes of death are tabulated below alphabetically.

Diseases.	Chinese.		Tamils.		Others.		Total.	Remarks.
	M.	F.	M.	F.	M.	F.		
Amoebiasis (intestinal) ...	11	...	19	10	...	...	40	
Amoebiasis (liver abscess)	1	...	3	...	...	...	4	
Ankylostomiasis	6	...	9	1	...	...	16	
Arterio-sclerosis	8	...	1	...	...	...	9	3 with cerebral haemorrhage
Ascariasis	...	...	4	...	...	...	4	1 convulsions, 3 ruptured liver abscesses
Beri-beri	14	...	...	...	...	...	14	
Cystitis	1	...	1	...	...	...	2	
Dysentery (bacillary) ...	57	...	133	45	...	...	235	
Dysentery (mixed bacillary and amoebic)	1	...	2	...	...	...	3	Only proved cases included.
Encephalitis haemorrhagica	1	...	2	...	...	...	3	During arsenical injections
Enteritis children (unspecified)	1	...	1	...	...	...	2	
Heart-patent foramen ovale	1	...	...	...	...	...	1	
Heart-mitral stenosis ...	1	...	...	...	...	...	1	
Heart-aortic stenosis ...	1	...	...	...	...	...	1	
Heart-pericarditis	1	...	...	...	...	...	1	With pleurisy
Hydro-cephalus	...	...	1	...	...	...	1	
Leukaemia-spleno-medullary	...	...	1	...	...	...	1	
Liver-cirrhosis	12	...	7	1	..	...	20	
Liver-primary carcinoma ...	7	...	...	...	...	...	7	
Lung-acute bronchitis ...	1	...	...	...	...	...	1	

Diseases.	Chinese.		Tamils.		Others.		Total.	Remarks.
	M.	F.	M.	F.	M.	F.		
Lung-chronic bronchitis	4	...	1	...	...	...	5	
Lung-bronchiectasis	1	...	2	...	...	...	3	
Lung-abscess	4	...	...	...	...	...	4	Secondary to lobar pneumonia
Lung-abscesses multiple	1	1	...	...	...	...	2	1 staphylococcal, 1 streptothrix
Lung-gangrene	6	...	2	...	...	...	8	
Lung-ch: interstitial pneumonia	1	...	...	...	...	...	1	
Lung-Empyema	4	...	1	...	...	...	5	All secondary to pneumonia
Lung-squamous celled carcinoma	1	...	...	...	...	...	1	Primary
Malaria	57	...	84	37	1	...	179	
Melioidosis	2	...	1	...	...	...	3	
Meningitis	4	...	2	...	...	...	6	All pneumococcal
Nephritis-parenchymatous	14	1	5	...	...	...	20	
Nephritis-interstitial	13	...	4	1	...	...	18	
Otitis-media-brain abscess	1	...	...	...	...	...	1	
Otitis-media-meningitis	1	...	...	...	...	...	1	
Peritonitis	2	...	...	1	...	...	3	1 ruptured pyosalpinx, 2 pneumococcal
Pernicious anaemia	1	...	3	1	...	...	5	
Pneumonia	41	...	58	10	1	...	110	6 broncho pneumonia
Pregnancy-toxaemia	...	...	...	1	...	...	1	
Pyaemia	2	...	3	3	...	...	8	Staphylococcal
Pyelonephritis	6	...	2	...	...	...	8	3 Staphylococcal, 5 coliform organisms
Sepsis	17	...	12	1	...	...	30	2 osteomyelitis, 2 suppurative arthritis, 1 puerperal septicaemia 25 cellutitis and skin infection
Sprue	...	...	...	1	...	1	2	
Status epilepticus	1	...	...	...	...	...	1	
Stomach-ulcer	4	...	...	...	...	...	4	1 acute haemorrhage, 2 chronic haemorrhages-anaemia, 1 perforation and peritonitis
Stomach-carcinoma	1	...	...	...	...	...	1	
Syphilis	8	...	2	2	...	...	12	5 Aortitis, 3 cerebro-spinal, 4 tertiary lesions in viscera and bones
Tuberculosis	116	2	58	14	...	...	190	
Tumours (malignant)	11	2	...	...	...	...	13	+9 tumours included elsewhere=22 in all
Typhus (tropical)	...	...	1	...	...	...	1	
Volvulus (sigmoid colon)	1	...	...	...	...	...	1	
Volvulus (small intestine)	1	...	...	...	...	...	1	

MORBID HISTOLOGY.

During 1928 specimens were examined from various sources.

The total number of cases was 398 compared with 252 in 1927. The majority were of post-mortem material collected by the staff of the Institute from the post-mortem room of the District Hospital. A number of specimens were frequently sectioned from one post-mortem, and so the number of sections cut and examined is far in excess of the figure 398, which refers to the number of different patients or cadavers.

Other specimens were received from Medical Officers, and two from Veterinary Officers. A large number of these specimens were of tumours, either removed at operation or at autopsy. A tabulation of these tumours, excluding inflammatory and other conditions is appended.

TUMOURS, RECEIVED FOR EXAMINATION, FROM MEDICAL OFFICERS OUTSIDE THE STAFF OF THE INSTITUTE FOR MEDICAL RESEARCH.

Disease.	Total No.	Operation specimens.	Post-mortem specimens.	Remarks.
Benign Tumours—				
Adenoma	7	7	0	Thyroid 4; breast 1; intestine 2.
Fibroma	6	6	0	Keloid 1; multiple fibromatosis 1; jaw 1; nose 1; female genitalia 2.
Ganglion	1	1	0	
Haemangioma	3	3	0	
Ovarian cyst	1	1	0	
Papilloma	3	3	0	
Parotid tumour mixed	1	1	0	
Teratoma	1	1	0	
Malignant tumours				
Carcinoma				
Spheroidal-celled	30	21	9	The post-mortem specimens included 6 primary carcinomata of liver, of which 5 came from male Chinese.
Secondary deposits	2	2		
Squamous celled	40	40		Cheek 2; penis 9.
Secondary deposits	3	3		
Basal celled	3	3		
Sarcoma	30	29	1	
Secondary deposits	1	1		
Glioma	5	—	5	
Myeloma	1	1		
Lymphadenoma	4	4		

The fact of five cases of primary carcinoma of the liver occuring in male Chinese subjects is interesting. These figures refer to morbidity in the Federated Malay States outside the immediate vicinity of Kuala Lumpur.

Reference to the post-mortem findings at the District Hospital, Kuala Lumpur, will show that out of 1,013 autopsies made in 1928, seven were made on male Chinese with primary carcinomata of the liver.

MISCELLANEOUS ROUTINE EXAMINATIONS.

During the year a number of routine examinations on blood, urine and cerebro spinal fluids, etc., have been made, 341 in all. These include blood sugar level (11); glucose tolerance (23); blood urea (4); and Van den Bergh tests (3); cerebro spinal fluid (43); urine examinations (200); pathological fluids (23); sputum (8). The blood examinations include two positive smears for Piroplasmata sent up by Veterinary Officers.

(Sd.) P. H. MARTIN,
Pathologist.

APPENDIX IV.

ANNUAL REPORT OF THE DIVISION OF ENTOMOLOGY FOR THE YEAR 1928.

INTRODUCTION.

When the staff of the Malaria Bureau was transferred to the Institute in March, malaria research was delegated to a separate division and a division of entomology was formed for the study of insects of medical importance.

Since H. C. Pratt was transferred to the Department of Agriculture in 1908, medical entomology in Malaya has been almost entirely concerned with the problems of *Anopheles* and malaria, and apart from G. F. Leicester's classic paper on the *Culicidae* generally, which was completed in 1905, little information on the insects other than *Anopheles* has been made available. A division devoted to entomology must concern itself with the study of more than a single genus, and efforts were made, therefore, to extend our knowledge of insects of medical importance without at the same time neglecting those of immediate importance from the point of view of malaria control. As will be seen in the section dealing with mosquitoes, the time has now come when a halt must be called in certain special investigations until fundamental matters such as the correct identification of species in their larval and adult stages, have been solved.

The move from the Malaria Bureau and structural alterations at the Institute, prevented the permanent laboratories from being occupied until late in the year, with the result that the work accomplished has neither been so comprehensive nor of such quality as would have been desired. A considerable amount of ground-work has been done, however, and thanks are due to the staff for carrying on under difficult conditions.

The quarters occupied by the division consist of a main laboratory where routine and experimental work is carried on, a private laboratory where special microscopic, systematic and office work is performed, and an insectarium specially built for breeding and keeping infected insects. All these were planned, fitted and equipped during the year, and complete apparatus for all ordinary investigations was in place by the end of November.

INVESTIGATIONS RELATING TO TROPICAL TYPHUS.

ECTOPARASITES OF RATS.

The possible connection between rats and tropical typhus prompted an investigation into the ectoparasites of these animals. During the previous year, Dr. Lewthwaite had collected and identified a large number of larval mites of the family Trombidiidae from the ears of rats caught in Kuala Lumpur and on an estate where typhus is endemic. This collection was handed over to the division and six species, of which *Schöngastia indica* Hirst was the commonest, were provisionally identified, while three additional species are as yet undetermined.

Adult mites of this family have been recorded and described from Malaysia by Vitzthum (1926) who recognised ten species, and by Oudemans. The larval mites on rats may be immature forms of any of the adults already recorded, or they may be different species, and considerable hesitation must be exercised in the description of presumably new species on larval forms alone. The life-histories of trombidiid mites are practically unknown, and great difficulty is experienced in rearing larvae. In fact only one or two species have ever been successfully reared to the adult stage, and statements as to the life-history and habits of these mites, based on the results obtained in other countries with a single species, are liable to be misleading. It is not proposed, therefore, to deal at length with this group until more facts have been accumulated.

Seven other ectoparasites were found on rats [*Rattus rattus diardi* (Jentink)] during the year, bringing the total to sixteen. Of these, two mites were common, *Laelaps echidninus* Berlese on the body and a species of *Notoedres* in the ears. Another species of *Laelaps* and a member of the family *Listrophoridae* were also found. Two species of Siphunculata (lice), of which the commonest appears to be *Haematopinus* (*Polyplax*) *spinulosus* Burm, were present on a number of rats, and most specimens examined carried at least one plague flea, *Xenopsylla cheopis* Roths.* In addition, a winged psocid was found in the fur in some specimens, and although it can hardly be included among the ectoparasites, its presence is recorded as a matter of interest.

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* Dr. J. Coutts Milne forwarded 248 specimens of fleas caught on rats in the Ipoh district. All were *X. cheopis.*

With a total of sixteen species, and the probability that more will be found, the selection of a possible vector of typhus is somewhat involved. Several of the trombidiid mites should be suspected, while the two species of *Laelaps* may be neglected at present owing to their apparent aversion to man. A case of *Notoedres* sp. attacking man is on record, while members of the family Listrophoridae are stated to feed only on the hair and to be restricted to definite hosts. Restriction to one host is also characteristic of the lice, but the hog-louse (*Haematopinus suis* Linn.) has been recorded temporarily on man, and *H. spinulosus* has been proved to transmit disease from rat to rat. The plague flea, as is well known, will attack man.

Mites belonging to the genera *Dermanyssus* and *Leiognathus*, which have been regarded as possible transmitters of disease to man, and are widely distributed on rats throughout the warmer parts of the world, have not so far been found. There appears to be little reason to doubt that species belonging to these genera will be found on local rats as investigations continue.

Mites on Oil Palms.

The large proportion of coolies contracting typhus who were engaged in pruning oil palms, led to a search for arthropods of possible importance in the material handled. Pruning consists of cutting off the lower leaves of the palm and removing the dead male and female flowers so as to allow the harvesters to collect the mature fruits. An examination of the old male flowers by the Berlese funnel method, revealed an unbelievable number of mites belonging to the families Cryptognathidae, Bdellidae, Trombidiidae, Gamasidae, and Oribatidae. While it would be expected that such material would contain a large acarine fauna, the possibility that many of the species present would be capable of attacking man should not be overlooked, and further investigation is desirable. The normal fauna of dead male flowers had previously been found to consist of a large number of lepidopterous larvae, principally belonging to the genera *Opogona* and *Anatrachyntis*, but these were practically absent in the material examined, which was taken from the area where the coolies who contracted typhus were working. An examination of male flowers from two other estates failed to reveal the same number or variety of mites, and it was subsequently learnt that it is only in the areas which are being opened up for harvesting that the dead flowers are allowed to remain for more than a few months. There appears, therefore, to be a change in the fauna as the flowers age, and the fact that the majority of typhus infections appear to be among coolies opening up areas for harvest, and therefore coming in contact with the old flowers containing mites, is suggestive.

Miscellaneous.

In view of the possibility of the artificial innoculation of arthropods with typhus virus being undertaken, attempts were made, in conjunction with Dr. Lewthwaite, to isolate the virus by the fractional centrifugalisation of blood. The method of Ségal (1922) was used, the fractions being injected into rats. Up to the end of the year, however, inconclusive results were obtained.

Arrangements were made with the Museums Department for the identification of all rats used in experimental work, Mr. Boden Kloss having kindly consented to undertake this important work.

INVESTIGATIONS ON MOSQUITOES.

Rice Fields.

At a meeting of the Malaria Advisory Board it was decided, following the recommendations of a Sub-Committee, to discontinue the work on rice fields at Rembau, Negri Sembilan, a portion of which was dealt with in the report for 1927. The locality proved to be unsuitable for carrying out accurate experiments, and the proposed drainage scheme was considered to be too expensive to be initiated without a better knowledge of fundamental detail. As already pointed out, the presence of *Anopheles maculatus* Theo. in the area surrounding the rice fields, and the absence of any effective means of running control experiments, would have destroyed the value of any results obtained.

It was also decided at this meeting that the proposed experiments in the experimental plots at the Government Experimental Plantation at Serdang, where rice will be grown under controlled conditions, should be carried on, and that they were more likely to yield results which could be more readily interpreted. An extensive preliminary mosquito survey of the area at Serdang was made, and a malaria survey was also undertaken by Dr. Hopkins. Delays in the construction of the experimental plots did not allow of systematic records being taken, however, but at the close of the year the plots had been practically completed, and the work will progress next year. It is proposed to study the occurrence of anopheline larvae in these plots over a period of several years, and since as many conditions as possible will be controlled from the point of view of the growth and yield of the crop, final results should be of considerable interest.

TRANSMISSION POWER OF *Anopheles*.

From a perusal of published information and the records of the Malaria Bureau on the susceptibility to malaria of Malayan *Anopheles*, it is evident that the number of dissections performed is too small to enable an accurate estimate of the relative danger of species to be formed, and most of our present evidence rests on epidemiological grounds. Since many species are essentially wild, and only caught in houses with difficulty, it was decided to try trapping as a means of obtaining a large number of specimens for dissection. Arrangements were also made, in conjunction with Dr. Allen, to ascertain by means of the precipitin test whether or not each mosquito dissected had fed on human blood. Proposals for obtaining traps were placed before the Malaria Advisory Board, in order to obtain sanction for the extra expenditure required.

In addition to providing more information on the infectivity of local anophelines, traps will be used to test a theory as to the intrinsic value of larval surveys as at present carried out. Several instances were recorded of species being captured in buildings when careful surveys of the surrounding areas failed to reveal the breeding places, and it was considered that a larval survey alone might not indicate the species actually responsible for malaria in the locality. Confirmation of these preliminary findings was received from the Philippines through Dr. C. Manalang, and the necessity for precipitin tests has recently been strongly emphasized by Walch and Sardjito (1928) who found that a large percentage of mosquitoes resting in houses had not fed on human blood.

REVISION OF SPECIES OF *Anopheles*.

Experiments on the anophelism of rice fields and on the comparative infectivity of species, necessitate accurate identification of larval and imaginal forms. It was found necessary to embark on a critical examination of Malayan species, and it is feared that a considerable amount of work on Malayan *Anopheles* has been rendered valueless by inaccuracy in identification. Keys for the determination of local anophelines have been issued from time to time, but excellent as they are for discriminating between a known number of species, should other species or varieties occur which are not included in the keys, confusion inevitably results. Thus it was found that two, if not three species have been confused under one name, *Anopheles fuliginosus*, and that the two varieties of *A. ludlowi* and of *A. maculatus* had not been discriminated. Some progress was also made in the separation of larval forms which were considered to be indistinguishable.

PROBABLE NEW VARIETY OF *A. umbrosus*.

Through the courtesy of Dr. J. I Baeza and the Government of Kedah, a presumably new variety of *Anopheles umbrosus* Theo. was taken at Pulo Langkawi. The larvae, which occur in brackish water along the coast, differ constantly from the type form, and examples of the imagines were sent home for comparison with other forms of this species.

LONGEVITY OF *A. maculatus*.

Prominence has recently been given in Europe to destruction of adults in houses as a practical measure for anti-malaria control, and the long infective life of anopheline mosquitoes recorded by Mayne (1922) and James (1926) has lent force to the argument. As few records of the possible longevity of *A. maculatus* appeared to be available, experiments were initiated and are still proceeding. It was found that the length of life varied greatly according to the conditions under which they were kept in the laboratory, and optimum conditions of moisture and environment had first to be ascertained. Under conditions of a constant relative humidity of 65 per cent. and raisins or blood as food, the life did not exceed seven days. As will be seen in Appendix II, the humidity drops to this figure at mid-day, which probably accounts for the difficulty often experienced in keeping adults alive for any length of time. With water and raisins available, using MacGregor's system (1927) the life was prolonged to an average of twelve days, and to seventeen when a blood meal was given. Using hurricane lamp globes containing a little water and raisins the longevity rose to twenty-two days, and to twenty-four when blood was available. In one case the life was as much as forty days, and in many instances nearly a month.*

When a second blood meal was offered, however, 80 per cent. of those which had fed over four days previously refused to bite. Whether the results of attempting to give a second meal infers that although highly susceptible, only a comparatively small percentage bite a second time and thus infect man, remains to be seen.

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* Many of the mosquitoes were still alive at the end of the year, so that final results will show the life to be longer than that stated.

SUMMARY OF COLLECTION RECORDS.

A summary of all records relating to anopheline breeding-places was made from the files of the Malaria Bureau. The accumulated results of over 20,000 collections and the identification of 126,176 larvae will thus be made available, and the summary will shortly be issued as a Bulletin from the Institute.

Interesting features are that very few species appear to be definitely restricted as to breeding-place, and that earth drains provide nineteen out of the twenty-four species and varieties recorded.

CULICINE MOSQUITOES.

Since the publication of Leicester's work the culicine mosquitoes have been rather neglected in the Federated Malay States. Collections were made at frequent intervals during the year in order to obtain notes on breeding-places, prevalence and diagnosis of larvae. The transmission of dengue and filariasis affords sufficient reason for a more detailed study of this group.

LARVICIDES.

As time and material permitted, a number of substances of possible larvicidal value was tested against *Anopheles vagus* Dön. So far nothing has been found which can compare with mineral oil in both price and efficiency.

Of the non-arsenical substances used, sodium silicofluoride gave the best results, killing 96 per cent. of the larvae in 20 hours at a concentration of 1 part in 10,000 of water under laboratory conditions. Calcium arsenate killed 80 per cent. of the larvae under similar conditions in the same time, but could not compare with Paris Green which only required one hour to kill 100 per cent. Commercial calcium cyanide (Cyanogas) was effective in killing all larvae in 1 hour 40 minutes when half the quantity used in the above experiments was employed, and was effective at lower concentrations. It is possible that this substance might have its uses in certain areas, but until more is known about its possible toxic effects on other animals and plants it cannot advance beyond the experimental stage.

Paris Green proved disappointing when applied to earth drains on a rubber estate in some experiments conducted by Dr. W. T. Quaife with the co-operation of the division. A grave disadvantage to its use on estates is that managers are unable, as is the case with mineral oils, to see where their anti-malaria gangs have been working or to check their efficiency. A number of commercial dyes was incorporated in the Paris Green dust mixture in an attempt to leave visible traces of dusting at small increased cost, but although one or two showed promise, on the whole results were disappointing.

Samples of oil distilled from scrap and earth rubber were submitted for test by the Health Department. They proved to be effective larvicides, but appeared less reliable than mineral oils. Although the toxicity was high when the oils were applied, it rapidly fell off, this apparently being due to the solution or emulsification of toxic constituents. Evaporation was more rapid than in the case of mineral oils, which would necessitate more frequent treatment in practice, and at present it would be difficult to be certain of obtaining oils of standard composition. With the present price of low grade rubbers it was doubted if it would be possible to place the oils on the market at a price to compare with mineral oils, and enquiries among planters and agency houses confirmed this view.

INVESTIGATIONS ON FLIES AND EXCRETA.

Although flies are not as troublesome in Malaya as in some other tropical countries, local outbreaks are of fairly frequent occurrence, and a number is always present in the vicinity of markets, cattle and pit latrines. Little information was available, so collections were made in several localities and material received from various sources was bred out in the insectarium. The specific identity of the common Malayan house-fly is at present doubtful, but it is probably *Musca bakeri* Patton. Breeding takes place in material with a much greater moisture content than would be suitable for *M. domestica*, and cow-dung is a prolific source of flies.

Cattle manure was observed to breed at least ten species, including *Stomoxys*, *Philaematomyia*, *Sepsis* and *Lucilia*. Manure in pig-sties provided several species, and kitchen refuse and rotting vegetation form prolific breeding-places if not looked after. A number of flies, whose breeding places have not yet been ascertained, was collected round latrines, and the larvae of a sarcophagid were found in large numbers in urine. The latter appears to develop in the urine and then to migrate to the ground where pupation takes place. It is prevalent in Chinese vegetable gardens where urine is stored.

Pit latrines are a prolific source of *Chrysomyia megacephala F.* a large green fly which is commonly seen on food in markets and provision shops. Considering the opportunities which flies have of visiting human excreta and food in this country, they must be responsible for the mechanical transmission of a considerable amount of disease. A small epidemic of bacillary dysentery was correlated with an increase of flies in the same area due to the presence of numerous coolies without provision for the disposal of excreta.

A small fly, *Aphiochaeta* sp., breeds in large numbers in semi-liquid manure, and at times causes a veritable plague in houses, entering the ice chest and being frequently found in commodes, especially those containing diarrhoeic stools. A plague of these flies in one house was traced to the stables, which had a floor of boards slightly raised over cement. The semi-liquid material caused by small amounts of dung and urine falling through the spaces between the boards on to the cement, was crowded with larvae. Dr. Allen found intestinal organisms in this fly and it is possible that the occurrence of successive cases of dysentery in the same house may be traceable to its presence.

SEWAGE DISPOSAL INSTALLATIONS.

A number of small installations, serving one or more houses, has recently been erected in Kuala Lumpur. They are of varying types, and many have not been constructed so as to exclude the breeding of mosquitoes and other flies. Several types were examined at the request of the Health Department, and material has been sent in from others by Dr. W. J. Vickers.

Three mosquitoes, *Culex quinquefasciatus* Say, *Aëdes* (*Stegomyia*) *albopictus* Skuse and *Armigeres obturbans* Walk., breed vigorously in many of these installations, and since *C. quinquefasciatus* is a house loving species they are the direct cause of much annoyance. All three species have been stated by workers in other countries to be carriers of dengue, in which case installations improperly built from the point of view of mosquito breeding are not only a nuisance but a definite danger to health.

The larva of the psychodid fly, *Telmatoscopus albipunctatus* Will., which is often mistaken for a mosquito larva, breeds freely in sewage tanks of all descriptions as well as in other foul liquid matter. As far as is known it is of no medical importance. Another psychodid, *Psychoda alternata* Say, which is well known in sewage farms in the United States, was found breeding in the gelatinous and amorphous film on the stones of sewage filters. Although of no proved danger, this fly is small enough to enter meat safes, and has been seen on food in houses. A fly of the family Ephydridae was also found breeding on the moist brickwork of filters, but nothing is as yet known about it.

MISCELLANEOUS INVESTIGATIONS.

Among minor investigations conducted during the year the following may be of interest:

1. An improved method of mounting mosquito larvae was evolved which is simple in application and allows taxonomic details to be seen clearly with little or no distortion. The mountant is a modification of the Berlese fluid, and the larvae are placed in the medium alive. Clearing takes place on the slide in a few hours.

2. Experiments for the exclusion of mosquitoes with wire gauzes of varying mesh were made at the request of the Principal Medical Officer. Using phosphor-bronze gauze of 12 meshes to the linear inch, 26 S.W.G. and 31 S.W.G., it was found that 38 per cent. of the mosquitoes used, including six species of *Anopheles*, were able to pass through. There was a difference of 2 per cent. in favour of the 26 S.W.G. With 14 mesh gauze of 24 and 28 S.W.G., 13 per cent. pass through, including three species of *Anopheles*. The difference in favour of the 24 S.W.G. was 13 per cent. Small culicines but no anophelines were able to pass through the ordinary cotton mosquito netting of 23 mesh, 24/80 cotton. These experiments were conducted on a small scale, and it is uncertain if the results could be applied to the screening of large buildings.

3. A case of acariasis in a European was sent in by Dr. Ansley Young. The patient, a planter, was walking in a heavy cover crop of *Calopogonium mucunoides* and placed his right foot in a hole covered by the plant. Shortly afterwards he experienced some irritation and found that his leg was covered with small "insects". On examination these were found to be tick larvae, and were provisionally identified as *Amblyomma testudinarium* Koch. They were removed and slight irritation was experienced for some time afterwards, but no general symptoms were reported. Dr. Stanton recorded the adult of this species "on foliage" in the Annual Report for 1910.

4. "Sawah itch", a form of dermatitis common among workers in the water of rice fields, was the subject of enquiries, and was thought to be connected with the presence of large numbers of snails. The work of Cort (1928) on a similar affection caused by *Cercaria elvae* in the United States, suggested that "sawah itch" might be due to some non-human *Cercaria* from the snails, which were determined as *Indoplanorbis exustus* Deshayes. A few *Cercariae* were found, but at the time there was no opportunity of following up the investigation, which was later transferred to Dr. Amies.

5. Chloropid flies of the genus *Microneurum* were forwarded from Pekan by Dr. G. A. Dunlop, who stated that they were commonly seen round the edges of ulcers and were believed to transmit a form of conjunctivitis. A member of this genus has been incriminated with the transmission of *Hemophilus conjunctivitidis* Bergey (Kock-Weeks bacillus) elsewhere.

Routine examinations and identifications are of great importance where little is known about the fauna, and if systematically performed may be included as a form of research. Over 10,000 specimens were collected mounted and examined, not including those used in experiments on larvicides, longevity, and the mesh of gauze.

The whole of the collection of mosquitoes taken over from the Malaria Bureau was remounted and properly labelled, and the spirit collection was examined and rearranged. Cabinets which contained cork carpet, which is unsuited to conditions in Malaya, were relined, but it is to be regretted that a large number of valuable specimens had already been destroyed before this work could be undertaken. Details of other routine work will be found in Appendix I.

STAFF.

On the transfer from the Malaria Bureau, two laboratory assistants and one attendant were transferred to the Malaria Research Division, and an extra probationer assistant was afterwards allotted to this division.

ACKNOWLEDGMENTS.

It is a pleasure to record the generous assistance of Medical and Health Officers, too numerous for separate mention, some of whose names appear in the body of the report. Thanks are especially due to the Museums Department and Capt. H. M. Pendlebury for help and free access to collections and literature in the museum; to the Agricultural Department and Mr. G. H. Corbett for the gift of specimens of flies and other co-operation; and to Dr. W. T. Quaife for much help, encouragement and advice.

B. A. R. GATER,
Entomologist, Institute for Medical Research.

APPENDIX I.

Reports issued	70
Reports, involving special investigation, issued	6
Specimens identified for the Health Department	1,063
Specimens identified for private practitioners and others ...	1,072

APPENDIX II.

TEMPERATURES AND HUMIDITIES IN THE INSECTARIUM.

Month.	Temperature, °F.				Relative Humidity.				
	Mean.		Max.	Min.	Mean.			Max.	Min.
	Max.	Min.			8 A.M.	Noon.	4 P.M.		
July *	85.8	78.0	90.0	72 0	84.9	64.6	61.9	90.5	51.2
August	85.0	77.5	90.0	71.5	83.7	65.6	65.5	90.4	52.7
September	86.0	78.0	90.0	72.8	83.9	63.5	63.8	87.6	51.3
October	84.4	77.3	89.0	73.0	84.0	67.3	73.6	90.5	53.4
November	83.8	76.9	87.0	73.0	85.4	69.2	75.7	90.5	60.8
December	84.3	77.3	88.8	72.7	82.2	67.5	68.3	93.5	47.8

* Records were begun on July 6th when equipment was completed,

Appendix V.

ANNUAL REPORT OF THE MALARIA RESEARCH DIVISION FOR THE YEAR 1928.

The Malaria Research Division was constituted at the end of March of this year with the object of undertaking research from the clinical and pathological, as distinct from the entomological viewpoint.

Hitherto research in these matters had been carried out by the Director, Institute for Medical Research, Bacteriologist or Pathologist and could not be conveniently performed by the former Malaria Bureau.

Brief details of investigations performed are given as follows :

1.—THE INCIDENCE OF "CRESCENT CARRIERS" AMONG LOCAL CASES OF SUB-TERTIAN MALARIA.

Over a period of seven months thick blood films were obtained from each case of sub-tertian malaria on the day of admission to hospital. These films were then examined in the laboratory, the diagnosis of sub-tertian malaria confirmed, and a search made for gametocytes. During the period mentioned films from 741 cases were examined and of these, 314 or 42.3 per cent. were found to have crescents as well. The percentage of crescent carriers on admission to hospital varied month by month from 30 to 56.1 per cent. The average crescent carrier rate of 42.3 per cent. among local cases appears to be higher than any recorded from India which has been 34.2 per cent. while the highest African rate recorded is 5.4 per cent.

2.—THE EFFECT OF SHORT COURSES OF QUININE TREATMENT ON CRESCENT CARRIERS.

As a rule Asiatic patients of the labouring and indigent class will not remain in hospital for many days after their malarial symptoms have been relieved and if discharge is not granted they frequently abscond. These patients are generally available for treatment from five to fourteen days.

A detailed investigation was made among 250 cases infected with *P. falciparum*, thick blood films being examined both on admission and discharge. The period of treatment in hospital with quinine, gr. xxx daily, varied from five to fourteen days, the average number of days under treatment being 7.1.

In each case gametocyte counts were made on admission and on discharge, these being expressed as the number of crescents in thick films per 100 leucocytes. Whether the crescents were present in sufficient numbers in the peripheral blood to render the patient capable of infecting suitable mosquitoes was provisionally decided by referring to the combined findings of Darling, Mayne and James relative to this point. In this series a provisional infective index of one gametocyte to 100 leucocytes was decided upon.

Result.

(a) *On admission.*

All of the 250 cases had trophozoites or ring forms of *P. falciparum* in the blood and of these, 126 cases or 50.4 per cent. had crescents as well. In accordance with the infective index specified above, 98 cases or 39.2 per cent. of the whole were regarded as capable of infecting mosquitoes.

(*b*) *On discharge.*

After an average period of treatment of 7.1 days with quinine, the trophozoites had disappeared in all cases but the number with gametocytes had risen to 160 or 64 per cent. and those regarded as infective to mosquitoes had risen to 134 or 53.6 per cent. From the epidemiological point of view these results were regarded as unsatisfactory.

3.—THE TREATMENT OF "CRESCENT CARRIERS" WITH PLASMOQUINE COMPOUND.

An investigation concerning the treatment of "crescent carriers" with plasmoquine compound was undertaken with the following objects.

- (*a*) To determine the minimum dose which would be effective in destroying sub-tertian gametocytes
- (*b*) To find whether this dose would be sufficiently free from toxic effects to enable plasmoquine to be given in hospitals for the purpose of sterilising "crescent carriers".
- (*c*) To ascertain whether the amount of plasmoquine given would be effective against gametocytes during the short period that most of our Asiatic patients are available for treatment.

Cases of sub-tertian malaria with gametocytes in the blood were treated. Those given plasmoquine compound consisted of 56 men comprising 35 Tamils, 15 Chinese and 6 Sikhs. A control group of 10 men consisting of 6 Tamils, 1 Chinese and 3 Sikhs were given treatment with quinine alone. These also had crescents with trophozoites. A further control group of five cases with trophozoites only were given quinine treatment.

For the treatment of "crescent carriers", plasmoquine compound was chosen instead of plasmoquine for the following reasons :

(*a*) Plasmoquine has a poor destructive effect on the trophozoites of *P. falciparum* and there was a possibility of these returning in large numbers during treatment if plasmoquine alone were given.

(*b*) According to animal experiments by Eicholtz, quinine lessens the toxic effects of plasmoquine.

(*c*) As quinine has been shown to have practically no direct action on crescents its administration would not introduce any appreciable error in estimating the effect of plasmoquine on the crescents.

DOSAGE.

After preliminary experiments to determine the effect of small doses of plasmoquine on the gametocytes of *P. falciparum* it was decided to administer a daily dose of eight tablets of plasmoquine compound, the total contents of these eight tablets being .04 grm. plasmoquine and .5 grm. quinine sulphate. Four tablets were given in the morning and four in the evening.

The control series were given a total daily dose of gr. xx quinine hydrochloride in the form of a mixture divided into a morning and evening dose of gr. x.

RESULTS.

(a) *The plasmoquine compound series.*

Among the 56 cases given plasmoquine compound the time of the disappearance of crescents varied from four to thirteen days, the greatest number of cases being free on the eighth day as shown in the following table.

TABLE I.

Day of treatment on which crescents disappeared	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	Total cases.
Number of cases	1	2	7	12	18	6	6	2	0	2	56

The average time taken for the crescents to disappear was 7.9. days. The number of crescents present at the beginning of treatment ranged from 2 to 177 per 100 leucocytes but the time taken for the crescents to disappear from the blood did not appear to depend on the number originally present.

The daily dose of gr. viii (.5 grm) quinine sulphate which was included in the compound was insufficient to keep the trophozoites under control in 16 cases or 21.5 per cent., for in these cases trophozoites were present after the third day of treatment or returned later in large numbers.

(b) *The quinine series.*

Among the ten cases treated with quinine the crescents ranged from 0 to 34 per 100 leucocytes at the beginning of treatment. In two cases without crescents on the first day of treatment these appeared on the third and fourth day. No trophozoites were found later than the third day but in all cases crescents persisted in the peripheral blood as long as these cases could be induced to remain under observation and treatment which was from 12 to 20 days.

THE DEGENERATED APPEARANCE OF CRESCENTS IN THE BLOOD OF PATIENTS UNDERGOING PLASMOQUINE TREATMENT.

Thin films from patients with large numbers of crescents originally in the blood were examined daily.

By the fifth day the protoplasm of the crescents stained irregularly, no chromatin could as a rule be seen and pigment in the gametocytes was eccentric and diffuse. No differentiation could be made at this period between male and female gametocytes. This, combined with the progressive disappearance of the crescents led to the conclusion that plasmoquine has a well defined gametocidal action in cases infected with *P. falciparum.*

TOXIC EFFECTS.

Three cases or 5.4 per cent. complained of abdominal pains after administration of plasmoquine compound tablets. The pains appeared to be relieved in these cases and prevented in others by giving large quantities of fluid with the tablets. No cyanosis or other toxic affects were noted. It has been suggested that plasmoquine causes bradycardia but from an analysis of pulse rates taken in different postures among the plasmoquine compound series and the quinine series it was found that slow pulse rates (in some cases between 40 and 44 per minute while reclining) occurred with equal frequency among the two series of cases. The slow pulse rates observed had no relationship to blood pressure.

Using continued observations on the two series of cases it was found that plasmoquine compound given in the doses specified had no adverse effect on blood pressure or haemoglobin percentage nor was any evidence of renal damage found during its use.

THE INFLUENCE OF TREATMENT WITH PLASMOQUINE COMPOUND ON SPLENIC ENLARGEMENT IN SUB-TERTIAN MALARIA.

It was found that where enlarged spleens existed and if these were of such a size to enable the diminution to be accurately measured, the average reduction in size over 10 days was 4.2 cms. among the plasmoquine compound series and that among the quinine series was 2.3 cms.

From this series of investigations it was concluded:

(*a*) That quinine is not an effective drug when used during short periods with the object of destroying the gametocytes of *P. falciparum.*

(*b*) That a dose of .04 grm. plasmoquine daily, when combined with quinine, is an efficient gametocide among sub-tertian hospital cases such as are generally met with in District hospitals in Malaya; that this dosage is sufficiently free from toxic effects to be given in these hospitals and elsewhere, but, as the margin between the effective and the toxic dose is so narrow, medical supervision is necessary; and that it is sufficiently active against gametocytes of *P. falciparum* in these doses to be effective in sterlizing all but a very few crescent carriers during a period of 10 to 12 days.

(*c*) That plasmoquine compound in its present form (one grain of quinine to each .005 grm plasmoquine) is not a well balanced drug because:

(i) When as in our cases, eight tablets daily were given with the primary object of destroying gametocytes, the gametocidal effect of .04 grm. plasmoquine daily was sufficient but the eight grains of quinine included in the plasmoquine compound tablets was not sufficient to destroy the trophozoites in all cases.

(ii) On the other hand if a larger number of tablets, such as sixteen or twenty daily were to be given with the object of destroying trophozoites as well by reason of the grain of quinine contained in each tablet, the amount of plasmoquine, .08 grm. or 0.1 grm., then included would become unnecessarily large as there is no object in using more than the effective quantity of plasmoquine to destroy the crescents, particularly when these larger doses may give rise to toxic symptoms.

(*d*) A combination permitting the convenient daily administration of .04 grm. plasmoquine and gr. xx quinine would be of advantage in treating cases of sub-tertian malaria with crescents. This should be effective from both the symptomatic and epidemiological points of view, the latter at present being unsatisfactory where the quinine treatment of sub-tertian "crescent carriers" is concerned.

4.—THE TREATMENT OF QUARTAN MALARIA WITH PLASMOQUINE

The available records of cases of quartan malaria treated with plasmoquine are comparatively few and no contrast between the efficacy of quinine and that of plasmoquine in these cases appears to have been established. Further, Fletcher has pointed out that quartan gametocytes are relatively resistant to the action of quinine. The comparative effects of plasmoquine and quinine were therefore investigated as follows :

Forty men comprising 20 Tamils, 16 Chinese and 4 Sikhs who had quartan malaria were given .06 grm. plasmoquine daily. The average weight among these cases was 48.5 kg. and the average age 28.5 years. Ten control cases consisting of 7 Tamils and 3 Chinese also with quarter malaria were given quinine gr.xx daily. In this series the average weight was 46.0 kg. and the average age 30.2 years.

(*a*) *Among the cases treated with plasmoquine.*—The blood finally became negative for all forms of the quartan parasite (including gametocytes) from the fourth to the ninth day of treatment with an average time of disappearance of six days.

Fuller detail is given in the following table.

TABLE II.

PLASMOQUINE CASES.

Day of disappearance of quartan parasites ...	4th	5th	6th	7th	8th	9th	Total cases.
Number of cases	2	14	14	3	6	1	40

(*b*) *Among the cases treated with quinine.*—In two of these, quartan gametocytes were still present on the eleventh and sixteenth days of treatment. Among the remaining eight cases all quartan parasites disappeared from the blood after periods of treatment varying from four to fourteen days, the average time of disappearance among the eight cases being 10 days.

The following table shows the results of treatment in the eight cases mentioned.

TABLE III.

QUININE CASES.

Days of disappearance of quartan parasites	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	Total cases.
Number of cases ...	1	...	1	1	...	...	1	1	...	1	2	8

Plasmoquine thus appeared to bring about a more rapid reduction in the number of quartan parasites and its gametocidal action appeared to be somewhat greater than that of quinine.

TOXIC EFFECTS.

A daily dose of .06 grm. plasmoquine was given to 40 cases over ten days and more. No cyanosis or serious toxic effects were noted. Cyanosis however as in the previous plasmoquine compound series would have been comparatively difficult to detect among the dark-skinned Tamils but easier to find among the fairer Chinese and Sikhs. Pains in the abdomen occurred at some time during treatment in about 10 per cent. of the cases but large quantities of fluid given with the tablets seemed to relieve these.

In two cases or 5 per cent. the plasmoquine appeared to cause a cardiac irregularity. On continued treatment, the condition disappeared by the eighth or ninth day.

Pulse rates below 50 per minute were observed in both the plasmoquine and quinine series of cases with equal frequency and no further evidence was obtained to show that plasmoquine produces bradycardia. Again as with the series of ''crescent carriers'' treated with plasmoquine compound, plasmoquine in doses of .06 grm. daily did not appear to cause any renal damage or to have any marked influence on the haemoglobin or blood pressure.

In opposition to the results observed previously, regarding the influence of plasmoquine compound among the sub-tertian cases in reducing the size of the spleen, the average splenic diminution in the quartan cases was 3.45 cm. among the plasmoquine treated cases and 4.9 cm. among those treated with quinine, over a period of ten days.

From the results observed daily in connection with the effect of the drugs given on the quartan parasites, it was concluded that plasmoquine was somewhat more efficient than quinine in destroying both asexual and sexual forms of *P. malariae*.

General Conclusions.

From a general survey of the results obtained in connection with the 56 ''crescent carriers'' given plasmoquine compound and the 40 quartan cases treated with plasmoquine, combined with the results observed in the cases treated with quinine alone, it was concluded that for adult cases the addition of plasmoquine .04 grm. daily to quinine in treatment would be advantage in destroying gametocytes particularly in sub-tertian malaria cases and also in cases of quartan malaria.

No evidence was found that plasmoquine causes bradycardia when used in doses of .04 or .06 grm. daily.

With reference to reduction of splenic enlargement, the contradictory results observed in the sub-tertian and quartan cases do not permit any definite conclusion, nor do the results, on the whole, support the suggestion that the abdominal pains observed in cases taking plasmoquine are due to rapid reduction in the size of the spleen.

5.—THE TREATMENT OF MALARIA WITH DIMEPLASMIN.

This new drug named dimeplasmin was of interest in representing an endeavour by the manufacturers of plasmoquine to produce a further synthetic remedy of the same chemical group, for malaria, which would be as effective as plasmoquine but would have the advantage of being less toxic. The Havero Trading Co. who are the Calcutta agents for the I.G. Farbenindustrie Aktiengesellschaft requested this institute to investigate the therapeutic value of dimeplasmin in malaria as although the drug had been found effective in destroying the plasmodia of bird malaria its value in human cases had not been determined.

We were therefore supplied with a quantity of this new drug together with details of preliminary animal and bird experiments made with dimeplasmin by Roehl and Eicholtz at Elberfeld. These gave some indication regarding human dosage and showed that dimeplasmin was as effective as plasmoquine in treating bird malaria but dimeplasmin was less toxic and did not cause methaemoglobinaemia in experimental animals.

We gave this drug to eleven malaria cases. Five of these had sub-tertian and four benign tertian malaria; one had quartan malaria and the remaining case had a mixed infection with *P. vivax* and *P. falciparum*. The average weight of these patients was 43 kg. and the average age 22.6 years.

Dosage.—Based on the animal experiments performed at Elberfeld our cases received an initial daily dose of 9.2 mg. to 12.9 mg. per kg. body weight *per diem* rising each day to a final and fixed dose on the fifth day and thereafter of 25.1 to 34.6 mg. per kg. body weight *per diem*.

The results of treatment with dimeplasmin are shown in the following table.

TABLE IV.

DIMEPLASMIN TREATMENT.

Case number.	Type of malaria.	Number of days treatment with dimeplasmin.	Day on which fever was still present.	Day on which parasites were still present.	Remarks.
1	B.T.	10	10th	10th	Given quinine from 11th day
2	S.T.	11	11th	11th	,, ,, 12th ,,
3	B.T.	10	10th	10th	,, ,, 11th ,,
4	B.T.	10	3rd	10th	,, ,, 11th ,,
5	S.T.	10	9th	10th	,, ,, 11th ,,
6	S.T.	10	8th	10th	,, ,, 11th ,,
7	B.T.	10	4th	10th	,, ,, 11th ,,
8	Quartan	9	9th	9th	,, ,, 10th ,,
9	S.T.	10	7th	10th	,, ,, 11th ,,
10th	S.T.	10	10th	10th	,, ,, 11th ,,
11th	B.T. and S.T.	6	6th	6th	,, ,, 7th ,,

The doses of dimeplasmin given to each patient were, according to the animal and bird experiments previously performed, well within the therapeutic limits but no evidence was obtained to show that, in our cases, it had any effect on the parasites or the malarial symptoms.

Toxic effects consisting of a pricking and burning sensation of the eyes accompanied by dimness of vision and marked photophobia were found in one patient; on cessation of treatment with the drug these symptoms disappeared within 24 hours. The urine of all patients taking dimeplasmin gave the same reaction with Mayer's reagent as does that of patients taking quinine, the only difference noted being that the excretion of dimeplasmin was delayed and continued over a longer period.

6.—THE TREATMENT OF MALARIA WITH ASEPLENE.

This drug was a proprietary preparation made in London and was said to cure malaria. It was widely advertised throughout Malaya and in Siam, particularly for the treatment of coolies on estates, also as a prophylactic against malaria. This Institute received a number of enquiries concerning the efficacy of the drug. Its cost was about one-tenth that of quinine and the makers in the pamphlets sent out with the drug strongly condemned the use of quinine or arsenic in the treatment of malaria, stating that quinine caused blindness and deafness, ultimately leading to death, and that arsenic caused cancer.

As a remedy for malaria many claims for the efficacy of Aseplene were made in the pamphlets which stated that there had not been a single failure in successfully treating the disease.

INVESTIGATION.—The Aseplene treatment was given to ten malaria cases, comprising four infected with *P. vivax,* one with *P. falciparum,* while five had mixed infections with of *P. vivax* and *P. falciparum.* The patients were under direct observation twice a day.

RESULTS.—No evidence was obtained to show that Aseplene had any effect on the malaria parasites which remained in the blood in all cases while the preparation was being given, nor could any amelioration of the symptoms be ascribed to Aseplene. Some of the patients had severe rigors and fever some days after the Aseplene treatment had been commenced and in most cases the parasites increased in number during this treatment. Finally, quinine had to be given to all cases.

7.—THE INCIDENCE OF THE FOUR HUMAN BLOOD GROUPS AMONG CASES OF MALARIA.

The results of investigation made in Italy appear to show that malaria occurs more commonly among patients belonging to certain of Moss's four human blood groups. As this has an important relationship to the immunology and epidemiology of malaria an investigation was undertaken locally to determine the following factors.

(i) Is malaria more common among certain individuals possessing the same blood group, or conversely are the individuals belonging to a certain blood group relatively immune from infection with malaria parasites?

(ii) Do the three known species of malaria parasite infect the individuals of each blood group with equal frequency or here again in these relative immunity or susceptibility to one or the other of these three species?

(iii) In relation to the problem of gametocyte carriers, do the individuals of one blood group rather than another eventually form gametocytes in the blood and in this way influence the epidemiology of malaria in districts where this group may predominate.

CONDITIONS OF INVESTIGATION.

These are given very briefly: Investigations were made among one race i.e. Tamils, as it has been repeatedly shown that the four blood groups vary in proportion as regards the race in which they are investigated.

Blood specimens were taken from 2,000 Tamils all of whom originally came from approximately the same area in Southern India; 1,000 of these were suffering from malaria and 1,000 were free from malaria. Their blood groups were determined by using serums containing group ii and group iii agglutinins.

Results were as follows:

(i) The distribution of the four blood groups in both series of cases is given in the following table:

TABLE V.

	Distribution of blood groups.					Total cases.
	Landsteiner ...	AB	A	B	0	
	Moss	i	ii	iii	iv	
Cases with Malaria ...	... ...	73	198	330	399	1,000
Cases without Malaria	... ...	72	193	341	394	1,000

CONCLUSION.

None of the blood groups appeared to show relative susceptibility or immunity to malaria in general.

(ii) With regard to infection with the different species of parasite, the results of investigations among 1,000 cases with malaria showing the distribution of cases according to blood group and also to the infecting species of plasmodium are shown in the following table. The distribution of the cases is expressed in percentages.

TABLE VI.

Species of plasmodium infecting 1,000 cases.	Percentages of cases occurring among the four blood groups.				
	Landsteiner ...	AB	A	B	O
	Moss	i	ii	iii	iv
P. vivax	... ...	34.3	43.4	38.8	36.7
P. falciparum	... ...	54.8	49.6	51.6	52.3
P. malariae	... ...	2.7	3.5	4.2	3.5
Both P. vivax and P. falciparum	... ...	6.8	3.5	4.5	6.5
,, P. falciparum and P. malariae ...	... ...	0	0	.3	.5
,, P. malariae and P. vivax	... ...	1.4	0	.6	.5
	Total ...	100%	100%	100%	100%

CONCLUSION.—No immunity or susceptibility to the three species of malaria parasite, either as a single infection or a mixed infection, was to be found among groups of cases by reason of the blood group to which they belonged.

(iii) In connection with gametocyte formation after malarial infection, cases showing the presence of gametocytes of *P. falciparum* were investigated. Of the 1,000 cases examined, 210 were found to have crescents in the blood. In the majority of cases these were associated with infection with *P. falciparum* alone. Crescents were also found in cases infected with both *P. vivax* and *P. falciparum* and, in a few cases, crescents, apparently from a previous or latent infection were found in cases showing trophozoites of *P. vivax* only.

The following table shows, among 210 cases with crescents, the distribution in percentages of the members of the four blood groups together with the associated species of infecting plasmodium.

TABLE VII.

Species of Plasmodium associated with 210 "Crescent Carriers."	Percentage of cases occuring among the four blood groups.				
	Landsteiner ...	AB	A	B	0
	Moss	i	ii	iii	iv
P. falciparum	... ...	91.7	91.3	88.2	90.3
P. falciparum and P. vivax ...	... ...	8.3	8.7	8.9	7.3
P. vivax	... ...	0	0	2.9	2.4
	Totals ...	100%	100%	100%	100%

CONCLUSION.—Gametocyte formation appeared to have no relationship to the four blood groups, the distribution of "crescent carriers" among these groups being approximately equal.

GENERAL CONCLUSIONS.

No connection could be traced between the incidence of the four human blood groups and immunity to malaria in general, immunity to species of parasite, or to the development of gametocytes.

8.—THE EFFECT OF MALARIAL INFECTION ON THE PANCREAS.

Involvement of the pancreas in cases infected with malaria parasites has been suggested by transient or permanent glycosuria occuring in connection with these cases.

An investigation with regard to pancreatic efficiency tests in a series of twenty-one cases of malaria which included acute and chronic cases of benign tertian, sub-tertian and quartan malaria, was carried out.

The following tests concerning the efficiency of the pancreas were performed on each case.

(i) Urinary diastase test.

(ii) Loewi's adrenalin mydriasis test.

(iii) Examination of faeces for insufficient protein digestion

(iv) Estimation of the faecal fat content.

(v) Glucose tolerance test.

A brief summary of the results of the investigation is given as follows :

(*a*) The urinary diastatic index was found to be within normal limits in every case.

(*b*) Loewi's adrenalin mydriasis test was negative in all the cases.

(*c*) Evidence of insufficient protein digestion was obtained in one case only.

(*d*) The estimation of the faecal fat content failed to show evidence of defective fat splitting.

(*e*) The glucose tolerance test showed that sixteen of the cases were deficient in sugar storage capacity.

(*f*) Glycosuria as demonstrated by Fehling's qualitative test, was not present in any of the cases.

The detailed figures obtained in the various tests are given in the following table.

TABLE VIII.

Serial number.	Nationality.	Age.	Type of infection.	Type of case.	Spleen in fingers enlarged.	Ova in faeces.	Urinary diastatic index.	Percentage of blood sugar after hours.					Percentage of urinary sugar after hours.			Percentage of fat in faeces.													
								Prior to Glucose.	½ hour.	1 hour.	1½ hours	2 hours.	Prior to Glucose.	1 hour.	2 hours.	Total fat.		"Unsoaped" fat.		Total fatty acids.		Free fatty acids.		Combined fatty acids.		Neutral fat.		Neutral fat as per cent. of total fat.	
																Sa.	Ca.	Sa.	Ca.	Sa.	Ca.	Sa.	Ca.	Sa.	Ca.	Sa.	Ca.	Sa.	Ca.
1*	T.	25	B.T.	Ac.	N.P.	Nil	16	.115	.132	.151	.119	.112	.03	.05	.05	8.4	11.1	7.7	7.0	3.0	3.9	2.0	2.0	1.0	1.9	5.7	5.0	67.8	45.0
2*	C.	21	B.T.	Ac.	N.P.	Nil	32	.075	.135	.120	.083	.095	.05	.06	.06	16.1	15.8	13.9	7.8	6.2	9.6	6.1	4.2	0.1	5.4	7.8	3.6	48.4	22.7
3*	T.	35	B.T.	Ac.	+ 1	Asc.	16	.133	.180	.196	.178	.166	.04	.13	.14	8.3	13.4	7.9	8.1	5.1	8.5	4.6	6.0	0.5	2.5	3.3	2.1	39.7	15.6
4*	T.	35	B.T.	Ac.	N.P.	Tri.	16	.115	.147	.165	.118	.117	.05	.08	.07	...	17.6	...	10.8	...	10.1	...	4.9	...	5.2	...	5.9	...	33.5
5	T.	37	B.T.	Ac.	+ 1	...	32	.140	.169	.184	.175	.173	.04	.05	.10														
6*	T.	24	B.T.	Ac.	N.P.	...	16	.083	.158	.164	.119	.072	.02	.05	.08														
7*	T.	25	B.T.	Chr.	N.P.	Nil	8	.105	.120	.144	.108	.121	.04	.05	.08	18.9	22.9	15.8	15.0	11.9	19.1	11.1	11.5	0.8	7.6	4.7	3.5	25.8	15.2
8	Sk.	20	B.T.	Chr.	N.P.	Ank.	16	.114	.135	.184	.143	.137	.08	.08	.09	18.1	18.9	15.4	8.2	10.1	12.2	8.8	2.9	1.3	9.3	6.6	5.3	36.4	34.4
9	T.	25	S.T.	Ac.	N.P.	Asc.	8	.117	.134	.140	.144	.115	.05	.06	.08	15.5	15.0	13.9	7.3	6.5	8.2	6.3	3.6	0.2	4.6	7.6	3.7	49.0	24.6
10*	Sk.	57	S.T.	Ac.	N.P.	Nil	8	.112	.175	.188	.213	.205	.07	.10	.05	35.3	38.4	9.8	6.9	25.6	31.0	5.3	1.5	20.3	29.5	4.5	5.4	12.7	14.0
11*	T.	28	S.T.	Ac.	+ 1	Nil	8	.106	.142	.167	.151	.142	.02	.04	.03	...	15.9	...	8.3	...	12.5	...	4.6	...	7.9	...	3.7	...	23.2
12*	C.	34	S.T.	Ac.	+ 1	Asc.	32	.122	.156	.140	.132	.130	.08	.10	.09	18.7	20.9	18.2	16.3	8.2	12.7	9.4	8.9	Nil	3.8	8.6	7.4	45 9	35.4
13*	C.	35	S.T.	Ac.	+ 4	...	16	.092	.133	.125	.108	.105	.08	.09	.07														
14*	C.	26	S.T.	Ac.	+ 2	...	32	.127	.186	.235	.255	.160	.03	.09	.11														
15	C.	44	S.T.	Ac.	N.P.	...	32	.133	.150	.177	.224	.206	.03	.10	.17														
16*	T.	30	S.T.	Chr.	N.P.	Ank.	8	.117	.164	.201	.202	.134	.07	.10	.06	11.5	13.4	11.1	7.2	5.1	8.8	5.1	3.3	Nil	5.5	6.0	3.9	52.1	29.1
17*	T.	25	S.T.	Chr.	N.P.	Nil	...	.080	.133	.158	.116	.132	.05	.06	.06	18.7	16.2	15.3	4.5	7.9	9.2	7.3	2.6	0.6	6.7	8.0	1.9	42.7	11.7
18	C.	20	Q.	Ac.	+ 3	Tri.	32	.100	.141	.157	.152	.130	.05	.08	.08	14.4	15.5	12.4	13.0	5.3	7.9	4.5	3.9	0.8	4.0	7.9	9.1	54.8	58.7
19*	Sk.	20	Q.	Ac.	+ 1	Nil	32	.112	.137	.159	.151	.134	.02	.10	.05	58.4	58.9	40.3	37.5	48.2	55.6	35.9	27.8	12.3	27.8	4.4	9.7	7.5	16.4
20*	T.	25	Q.	Ac.	+ 4	Str.	16	.117	.142	.157	.152	.122	.03	.05	.02	...	20.6	...	11.8	...	15.4	...	6.7	...	8.7	...	5.1	...	24.7
21*	T.	25	Q.	Chr.	N. P.	Nil	...	.117	.189	.200	.176	.136	.09	.08	.08	8.4	7.6	8.3	5.0	3.5	5.8	4.1	2.8	Nil	3.2	4.2	2.2	50.0	28.9

T.=Tamil. Sk.=Sikh. C.=Chinese. B. T.=Benign Tertian. S. T.=Sub-tertian. Q.=Quartan. Ac.=Acute. Chr.=Chronic. N. P.=Not palpable. Ank.=Ankylostoma. Asc.=Ascaris. Tri.=Trichiuris. Str.=Strongyloides. Sa.=Saxon. Ca.=Cammidge. *=Previous attacks.

9.—THE CULTURE OF MALARIA PARASITES.

On three occasions *P. falciparum* has been successfully cultivated from cases of sub-tertian malaria. The method used was that of Bass, as modified by the brothers Thomson.

In every case the ring forms of *P. falciparum* were observed to develop in culture up to complete schizogony but no conclusive evidence of a second generation from merozoites entering other red cells was obtained.

10.—PARASITE AND SPLEEN SURVEYS.

As part of a malarial survey carried out at the Government Experimental Plantations, Serdang, spleen and blood examinations were performed on 515 Tamils, including 82 children aged two to ten years. The infantile spleen rate was 21.9 per cent., while the infantile parasite rate was 28.0 per cent.

Among the infected infants, *P. vivax* was found in 56.5 per cent. of the cases and *P. falciparum* in 43.5 per cent.

The adult spleen rate was 12.7 per cent. and the adult parasite rate was 23.7 per cent.

Among the infected adults, *P. vivax* was found in 61.4 per cent. of the cases, *P. falciparum* in 34.5 per cent. and *P. malariae* in 2.3 per cent. while in 1.8 per cent. of the cases both *P. vivax* and *P. falciparum* were found.

11.—STAINING METHODS FOR MALARIA PARASITES.

With Leishman's stain, better and more constant results were obtained in thin blood films by the addition to the distilled water of potassium carbonate (0.1 per cent.) to bring the resulting diluting fluid to pH 7.2.

With Giemsa's stain excellent differentiation in staining of the various parts of the parasites has been secured by buffering the distilled water with both potassium dihydrogen phosphate and disodium monohydrogen phosphate as suggested by Coenaes.

For thick films rapidity in diagnosis has been gained by drying the film in a dessicator containing calcium chloride, for half an hour, while the addition of small amounts of potassium carbonate to the Giemsa's stain for thick films has also resulted in better differential staining. Bini's panoptic method for thick films has been found most satisfactory. This consists in staining the thick films which previously must have been dried thoroughly, with Giemsa's stain, 3 drops to 3 c.c. buffered distilled water for 3 minutes. The slide is then drained and Leishman's stain added in the proportion of 3 drops to 3 c.c alkaline diluent for 8 minutes.

12.—OTHER INVESTIGATIONS.

The following are as yet incomplete and comments on progress are briefly given :

(*a*) Albuminuria in malaria is stated to vary in relation to the country in which the malaria occurs and also as regards the species of infecting plasmodium. Daily observations during treatment have been made on 287 malaria cases comprising 161 infected with *P. falciparum*, 60 with *P. vivax* and 66 with *P. malariae*. So far the incidence of albuminuria seems to be somewhat more common among the quartan cases, less common among sub-tertian cases and least among benign tertian cases;

(*b*) Quartan malaria is said to occur in certain localities only. An attempt has been made to trace the place of probable infection in each case of quartan malaria in which reasonably accurate data can be obtained. Particulars regarding time and place of infection are then entered on a district map. So far, 45 cases have been investigated but no conclusive evidence on this point is as yet obtainable;

(*c*) The rate of absorption from the bowel and excretion in the urine of quinine, its derivatives, or other alkaloids of cinchona, are both of interest in connection with treatment and checking of treatment in malaria. Quinine hydrochloride in powder form in doses of five grains given to three healthy men of different nationalities, commenced to be excreted in the urine (on an average) within 40 minutes and continued over a period of ten hours. The figures for the same amounts of quinine alkaloid, quinine ethyl carbonate and cinchonine were respectively 160 minutes and eleven hours, 120 minutes and nine hours, 140 minutes and ten hours;

(*d*) It is of advantage to be able to check rapidly the stated quantity of quinine in a mixture for the prevention of fraud or error in hospitals or dispensaries. A simple method involving the dilution of the quinine mixture with water, the addition of Mayer's reagent and the use of Brown's standard opacity tubes as described by Knowles, has been found rapid and sufficiently accurate;

(*e*) Mayne (1928) has found the *Protesoma praecox* in birds may infect *anopheles* and give rise to oocysts thereby introducing an error in estimating the importance of certain species in relation to human malaria. In a small number of Malayan sparrows examined (30) no blood infection with *Proteosoma praecox* has yet been found;

(*f*) While obtaining agglutinating serum for the purpose of blood grouping (section 7) it was found that among 25 serum donors comprising group ii and group iii individuals the serum varied greatly as regards agglutinin content although the corpuscles obtained from these donors appeared to be constant as regards agglutinogens. No explanation may yet be advanced regarding the factors responsible for this phenomenon;

(*g*) Attempts have been made by various methods to estimate quantitatively the numbers of malaria parasites in blood for purposes of accurate comparison between cases and also as an indication of the accuracy of each method.

Co-relation counts made at the same time on the same infected individual have been performed by four methods: direct counting in a haemocytometer chamber, relative counts using known suspensions of fowls corpuscles according to Sinton's method, relative counts per 100 levcocytes in thick films and relative counts per 100 microscope fields in thin films. In the last three methods the preparations were stained.

The greatest variation occurred in thin films. Each method however, has its standard of convenience and accuracy. Sinton's fowl corpuscle method has been found satisfactory, but for routine counting, provided the variation in the number of leucocytes is not great, the number of parasites in any stage in relation to the number of leucocytes in thick films has been found convenient and, on checking with the haemocytometer, sufficiently accurate.

R. GREEN,
Acting Malaria Research Officer I.

APPENDIX B.

REPORT OF THE CHIEF HEALTH OFFICER, FEDERATED MALAY STATES, FOR THE YEAR 1928

HEALTH STAFF.

1. The sanctioned staff for the year was

EUROPEAN OFFICERS.

Chief Health Officer, Federated Malay States	1
Senior Health Officer, Perak	1
Senior Health Officer, Selangor and Pahang	1
Senior Health Officer, Negri Sembilan	1
Health Officers	28
Medical Inspectors of Schools	2
Lady Medical Inspectors of Schools	2
Chief Sanitary Inspectors	8

ASIATIC OFFICERS.

Assistant Surgeons	8
Health Inspectors	61

2. Of the above officers, there were available on 31st December, 1928:

EUROPEAN OFFICERS.

Chief Health Officer, Federated Malay States	1
Senior Health Officer, Perak	1
Senior Health Officer, Selangor and Pahang	1
Senior Health Officer, Negri Sembilan	1
Health Officers	19
Lady Medical Inspector of Schools	1
Chief Sanitary Inspectors	2

ASIATIC OFFICERS.

Assistant Surgeons	6
Health Inspectors	61

3. There were two Chief Sanitary Inspectors, one was stationed at Tapah to supervise the anti-malarial works in connection with the road to Cameron's Highlands Plateau (4,750 ft.) until he was transferred to the Sanitary Board, Kuala Lumpur, temporarily on 1st July, 1928, and the other was stationed at the Health Office, Ipoh.

4. There were six Assistant Surgeons whose duties are principally in the towns assisting the Health Officers and to inspect dead bodies, they were stationed one each at Ipoh and Taiping, two each for Seremban and Kuala Lumpur (pending one going on leave) and one was subsequently stationed at Port Swettenham from 16th June, 1928, on the return of the other to Seremban from leave.

5. Eleven Health Inspectors appeared for the Royal Sanitary Institute Examination held in November, 1928, at Singapore, of whom ten passed the prescribed examination.

6. The following were the principal changes which took place during the year:

Dr. A. R. Wellington, Chief Health Officer, Federated Malay States, was on duty in India from the beginning of the year and resumed duty on 5th March, 1928. He took over duties as Acting Principal Medical Officer, Federated Malay States, with effect from 24th June, 1928, on the death of Dr. R. Dowden.

Dr. A. K. Cosgrave, M.C., Senior Health Officer, Selangor and Pahang, was acting as Chief Health Officer, Federated Malay States, from 1st January to 4th March, 1928, in addition to his duties.

Again he was acting for Chief Health Officer, Federated Malay States, from 16th November to the end of the year. on his return from leave.

Dr. E. H. Black was acting as Chief Health Officer, Federated Malay States, from 24th June to 15th November, 1928, when he was relieved by Dr. Cosgrave.

STATE OF PERAK.

7. The following officers were holding the post of Senior Health Officer, Perak, during the year:

Dr. F. R. Sayers, from 1st January to 25th March, 1928, when he was transferred as Chief Health Officer, Singapore.

Dr. E. H. Black (acting) from 26th March to 22nd June, 1928.

Dr. F. V. Jacques (acting) from 23rd June to 4th October, 1928, in addition to his duties as Health Officer, Perak North.

Dr. A. G. H. Smart, M.B.E., from 5th October to 31st December, 1928 (appointed Senior Health Officer, Perak, from 21st May, 1928).

HEALTH OFFICERS IN CHARGE OF DISTRICTS.

Perak North.—Dr. F. V. Jacques from 1st January to 31st December, 1928.

Kuala Kangsar and Upper Perak.—Dr. G. I. Shaw, M.M., from 14th July to 31st December, 1928 (new appointment from 14th July, 1928).

Kinta District.—Dr. A. Dunlop from 20th March to 2nd September, 1928, when he was transferred to the Medical Branch.

Dr. W. E. Holmes from 3rd September to 31st December, 1928 (new appointment from 20th March, 1928).

Kinta Sanitary Board.—Dr. W. J. Moir from 1st January to 20th March, 1928.

Dr. J. C. Milne from 5th April to 28th December, 1928.

Dr. M. J. Graham from 29th December to 31st December, 1928.

Batang Padang.—Dr. P. G. Currid from 1st June to 31st December, 1928, (new appointment from 1st June, 1928).

Lower Perak.—Dr. C. S. Ryles, O.B.E., from 1st January to 15th April, 1928.

Dr. E. A. Struthers from 16th April to 31st December, 1928.

CHIEF SANITARY INSPECTORS.

Kinta District.—Mr. J. Wishart from 1st January to 31st December, 1928.

Batang Padang.—Mr. E. G. Montford from 1st January to 30th June, 1928 (transferred to Sanitary Board, Kuala Lumpur, on 1st July, 1928).

ASSISTANT SURGEONS.

Kinta District.—Mr. C. N. Abraham from 1st January to 31st December, 1928.

Perak North.—Mr. K. Markandu from 1st January to 31st December, 1928.

STATE OF SELANGOR.

8. The following officers performed the duties of Senior Health Officer, Selangor and Pahang, during the year under review:

Dr. A. K. Cosgrave, M.C., from 1st January to 9th April, 1928.

Dr. W. O. Pou from 10th April to 15th November, 1928, and again from 5th December to the end of the year.

Dr. E. H. Black from 16th November to 4th December, 1928.

HEALTH OFFICERS IN CHARGE OF DISTRICTS.

Kuala Lumpur.—Dr. W. O. Pou from 1st January to 18th June, 1928, and again from 16th November to 4th December, 1928. He acted as Senior Health Officer, Selangor and Pahang, from 10th April to 18th June, 1928, in addition to his duties.

Dr. W. J. Vickers from 19th June to 15th November, 1928, and again from 5th December to 31st December, 1928.

Kuala Lumpur.—Drs. R. S. Johnston and E. P. G. Ritchie were attached to the Health Office, Kuala Lumpur, from 8th March to 10th June and from 16th June to 17th October, respectively.

Selangor East.—Dr. W. J. Vickers from 1st January to 19th June, 1928.

Dr. R. S. Johnston from 20th June to 31st December.

Dr. E. P. G. Ritchie was attached to the Health Office, Selangor East, from 4th May to 16th June, 1928.

Klang and Port Swettenham.—Dr. E. R. C. Cooke, M.C., from 1st January to 30th April, 1928 (transferred as Acting Venereal Diseases Specialist).

Dr. C. S. Ryles, O.B.E., from 17th April to 2nd November, 1928 (resigned on 3rd November, 1928).

Dr. H. J. Lawson from 3rd November to 31st December, 1928 (in addition to his duties as Health Officer, Coast).

Selangor Coast.—Dr. M. J. Graham from 1st January to 21st April, 1928.

Dr. H. J. Lawson from 22nd April to 31st December, 1928.

STATE OF NEGRI SEMBILAN.

9. The following officers acted as Senior Health Officer, Negri Sembilan, during the year:

Dr. E. H. Black from 1st January to 27th March, 1928.

Dr. W. J. Moir from 28th March to 31st December, 1928.

HEALTH OFFICERS IN CHARGE OF DISTRICTS.

Seremban.—Dr. E. A. Struthers from 1st January to 15th April, 1928.

Dr. R. A. Pallister from 1st January to 31st January, 1928 (transferred to the Medical Branch with effect from 1st December, 1928).

Dr. R. M. Forsayeth from 7th April to 31st December, 1928.

Dr. C. H. Williams from 7th April to 31st December, 1928.

10. The following were appointed as Health Officers, Federated Malay States, during the year:

Dr. J. C. Milne on 8th March, 1928.
Dr. P. G. Currid on 8th March, 1928.
Dr. R. S. Johnston on 8th March, 1928.
Dr. H. J. Lawson on 8th March, 1928.
Dr. C. H. Williams on 8th March, 1928.
Dr. R. M. Forsayeth on 8th March, 1928.
Dr. G. I. Shaw, M.M., on 23rd March, 1928.
Dr. A. Dunlop on 23rd March, 1928.
Dr. E. P. G. Ritchie on 5th April, 1928.

11. Drs. Pallister, Dunlop and Cooke were transferred to the Medical Branch on 31st January, 1928, 6th September, 1928, and 1st May, 1928, respectively.

12. Dr. (Miss) E. A. Robertson was appointed as Lady Medical Inspector of Schools, with effect from 8th March, 1928.

13. Dr. C. S. Ryles, O.B.E., resigned the service on 3rd November, 1928.

14. Dr. J. G. Castellain, Health Officer, Railways, proceeded on leave to England on 24th October, 1928.

Dr. E. P. G. Ritchie then acted till the end of the year.

DUTIES OF THE HEALTH BRANCH.

15. The duties of the members of the Health Branch include—

(i) Vital statistics and work under the Registration of Births and Deaths Enactment.

(ii) Malaria investigation and mosquito control.

(iii) Work under the following Enactments:
    (*a*) Quarantine and Prevention of Disease Enactment;
    (*b*) Sanitary Boards Enactment;
    (*c*) Sale of Food and Drugs Enactment;
    (*d*) Labour Code;
    (*e*) Health Board Enactment;
    (*f*) Excise Enactment.

(iv) General, including inspection of schools, Government cooly lines, waterworks, etc.

(v) Maternity and Infant Welfare.

REVENUE AND EXPENDITURE.

16. The only revenue collected was that for certificates issued under the Births and Deaths Registration Enactment, and of the sale of mosquito identification books. The total amount collected during the year was $4,001.

17. The expenditure debited against the Health Branch was:

Personal Emoluments	$291,821.53
Temporary Allowances	42,584.94
Other Charges, Annually Recurrent	125,146.86
Other Charges, Special Expenditure	6,803.99
	$466,357.32
Clerical Service	55,693.53
Total ...	$522,050.85

HEALTH LEGISLATION.

18. The following amendments were passed during the year:

Under "The Labour Code, 1923"—

Gazette Notification Nos. 2217, 2222, 3034, 3036, 3244, 3547, 3872, 4627, 4628, 4642, 5939, 6555.

Under "The Deleterious Drugs Enactment, 1925"—

Gazette Notification No. 8466.

Under "The Excise Enactment, 1923"—

Gazette Notification Nos. 46, 223, 7667, 7668, 7669 and 7670.

Gazette Notification Nos. 1121, 7530 and 3141 refer to Selangor only.

VITAL STATISTICS.

19. Populations are estimated from the census figures which are believed to be correct. Immigration and emigration have a greater influence on population than have births and deaths. Accurate information as regards immigration and emigration especially by rail are not available and tables cannot be given.

20. Increase in population is calculated on the arithmetical increase basis as experience has shown this to be more reliable than that based on geometrical grounds.

21. Births and deaths figures are obtained from notifications compulsory under the Registration of Births and Deaths Enactment which is everywhere in force. The total number of births and deaths is approximately correct. The accuracy of diagnoses as to causes of deaths is in the majority of cases open to question, for few of the cases were seen by a qualified medical man previous to decease. In each of the four large towns every uncertified body is viewed by the Assistant Health Officer who interrogates the friends and forms a diagnosis. In rural districts these duties are carried out by the Police.

22. Deaths in towns are debited against the town only if the deceased was resident there for three months or more previous to death. The towns contain hospitals which cater both for the town and the district surrounding it. It is a well-known fact that chronic cases from the rural areas drift to the towns in the hope of getting more skilled treatment. Taking all things into consideration even with a qualifying period of three months, a number of deaths are debited against the towns which should be debited against the rural areas where the disease was contracted.

23. The general death-rate for the four States was 29.63 per mille as against 32.11 for the whole of the Federated Malay States for 1927.

24. The number of deaths attributable to fevers (most of them probably malaria) was 20,053 or 44.13 per cent. of the total. Last year the percentage was 42.91.

25. Dysentery and diarrhoea accounted for 6.38 per cent. of total deaths, pulmonary tuberculosis for 4.35 per cent., pneumonia for 6.37 per cent. and convulsions for 11.47 per cent.

26. The following figures are put up for comparison, 1911 being the year the Health Branch was formed.

Year.	Federal.		Kuala Lumpur Town.		Estates.	
	General death-rate.	Fevers death-rate.	General death-rate.	Fevers death-rate.	General death-rate.	Fevers death-rate.
1911	39.11	17.47	39.02	9.78	62.90	Not known
1928	29.63	13.08	20.55	2.14	14.41	4.23

Few Asiatic-owned estates—especially the smaller ones—will admit the existence of sickness or the occurrence of a death, and nil returns are sent to the Health Officer, this tends to prevent these figures being as accurate as we would wish.

VITAL STATISTICS (FEDERAL).

POPULATION.

27. The population of the Federated Malay States as estimated at the end of June, 1928, was 1,533,612 distributed as follows:

Perak	675,179
Selangor	478,565
Negri Sembilan	213,971
Pahang	165,597

28. Assuming that the races remain in the same proportion as in the census year, the race distribution is as follows:

State.	Europeans and Americans.	Eurasians.	Malays and other natives of the Archipelago.	Chinese.	Indians.	Others.
Perak	2,519	1,066	268,196	229,937	171,493	1,968
Selangor	3,278	1,843	111,242	185,027	174,942	2,233
Negri Sembilan	1,250	559	83,378	82,809	44,830	1,145
Pahang	382	143	113,227	41,217	10,202	726
Total	7,429	3,611	576,043	538,990	401,467	6,072

BIRTHS.

29. Fifty-two thousand, seven hundred and seventy-one births were registered during the year, giving a birth-rate of 34.41 per mille of population as against 48,013 births and a birth-rate of 31.91 in 1927.

The following table shows the number of births and birth-rates according to races:

Race.	No. of births.	Birth-rate.
Europeans and Americans	148	19.92
Eurasians	127	35.17
Malays and other races of the Archipelago	22,042	38.26
Chinese	19,067	35.38
Indians	11,315	28.18
Others	72	11.86

DEATHS.

30. Forty-five thousand, four hundred and thirty-seven deaths were registered, giving a death-rate of 29.63 per mille. The number of deaths in 1927 was 48,323 and the rate was 32.11.

The distribution of deaths among the several races were as follows:

Race.	No. of deaths.	Death-rate.
Europeans and Americans	41	5.52
Eurasians	48	13.29
Malays and other races of the Archipelago	14,405	25.00
Chinese	16,909	31.37
Indians	13,948	34.74
Others	86	14.16

31. The deaths and death-rates for the total population for the last ten years were as follows:

Year.	Population.	Deaths.	Rate per mille.
1919	1,315,700	38,645	29.37
1920	1,351,541	43,705	32.34
1921	1,304,825	38,077	29.18
1922	1,360,876	35,028	25.74
1923	1,389,667	33,914	24.40
1924	1,418,455	33,585	23.68
1925	1,447,243	34,153	23.60
1926	1,315,606*	38,445*	29.22*
1927	1,504,823	48,323	32.11
1928	1,533,612	45,437	29.63

* Excluding Pahang.

32. Table showing causes of deaths in 1928:

Diseases.	No. of deaths.	Rate per mille.
Malaria	20,053	13.08
Dysentery and diarrhoea	2,900	1.89
Pneumonia	2,893	1.89
Pulmonary tuberculosis	1,977	1.29
Ankylostomiasis	254	.17
Beri-beri	620	.40
Syphilis	126	.08
Enteric (typhoid)	37	.02
Tetanus	47	.03
Cerebro-spinal meningitis	10	.01
Convulsions	5,211	3.40
Bright's disease	147	.09
Ptomaine poisoning	147	.09
Influenza	62	.04
Blackwater fever	16	.01
Plague	5	—
Cancer (including sarcoma)	87	.06
Diphtheria	10	.01
Typhus (tropical)	1	—
Other diseases	10,882	7.09

33. The following table shows the deaths and death-rates from the principal diseases for the last ten years:

Year.	Malaria.		Dysentery and diarrhoea.		Pulmonary tuberculosis.		Beri-beri.	
	Deaths.	Rate.	Deaths.	Rate.	Deaths.	Rate.	Deaths.	Rate.
1919	16,975	12.90	3,712	2.82	2,445	1.86	930	0.71
1920	20,595	15.24	3,804	2.81	2,634	1.95	431	0.32
1921	17,168	13.16	2,999	2.30	2,255	1.73	422	0.32
1922	15,570	11.44	2,419	1.78	2,393	1.76	443	0.33
1923	15,516	11.17	2,142	1.55	1,934	1.39	378	0.27
1924	14,283	10.07	1,961	1.38	1,916	1.35	453	0.32
1925	14,377	9.93	1,945	1.34	2,001	1.38	424	0.29
† 1926	16,531	12.57	2,744	2.09	1,873	1.42	314	0.24
1927	20,736	13.78	3,454	2.30	2,011	1.34	1,057	0.70
1928	20,053	13.08	2,900	1.89	1,977	1.29	620	0.40

† Excluding Pahang.

34.—

VITAL STATISTICS (*State figures for comparison*).

BIRTH TABLE.

State.	No. of births.	1928 birth-rate per 1,000 living.	1927 birth-rate.
Perak	22,851	33.84	30.59
Selangor	17,961	37.53	33.97
Negri Sembilan	6,823	31.89	30.16
Pahang	5,136	30.96	33.60

35. Birth statistics of different nationalities.

State.	Europeans and Americans.		Eurasians.		Malays and other natives of the Archipelago.		Chinese.		Indians.		Others.	
	Births.	Birth-rate.	Births.	Birth-rate.	Births.	Birth-rate.	Births.	Birth-rate.	Births.	Birth-rate.	Births.	Birth-rate.
Perak	57	22.63	33	30.96	10,156	37.87	7,872	34.24	4,698	27.34	35	17.78
Selangor	82	25.02	66	35.81	4,925	44.27	7,603	41.09	5,262	30.08	23	10.30
Negri Sembilan	6	4.80	26	46.51	3,574	42.86	2,144	25.89	1,066	23.77	7	6.11
Pahang	3	7.85	2	13.99	3,387	29.91	1,448	35.13	289	28.32	7	9.64

36.—

DEATH TABLE (*State figures for comparison*).

State.	No. of deaths.	Death-rate, 1928.	Death-rate, 1927.
Perak	18,256	27.04	29.70
Selangor	13,893	29.03	30.17
Negri Sembilan	7,050	32.95	35.39
Pahang	6,238	37.60	43.32

37. Deaths and death-rate of different nationalities.

State.	Europeans and Americans.		Eurasians.		Malays and other natives of the Archipelago.		Chinese.		Indians.		Others.	
	Deaths.	Death-rate.	Deaths.	Death-rate.	Deaths.	Death-rate.	Deaths.	Death-rate.	Deaths.	Death-rate.	Deaths.	Death-rate.
Perak	15	5.95	12	11.25	5,560	20.73	7,513	32.67	5,113	29.81	43	21.84
Selangor	19	5.80	21	11.39	2,316	20.81	5,849	31.61	5,665	32.38	23	10.30
Negri Sembilan	4	3.20	13	23.26	2,348	28.16	2,146	25.92	2,528	56.40	11	9.61
Pahang	3	7.85	2	13.99	4,181	36.04	1,401	34.48	642	62.93	9	12.40

38. Table showing deaths and death-rates from principal diseases.

State.	Malaria.			Dysentery and diarrhoea.			Pulmonary tuberculosis.			Beri-beri.		
	Deaths.	Rate.		Deaths.	Rate.		Deaths.	Rate.		Deaths.	Rate.	
		1928.	1927.		1928.	1927.		1928.	1927.		1928.	1927.
Perak	8,438	12.50	13.62	883	1.31	1.63	900	1.33	1.37	134	0.20	0.35
Selangor	5,033	10.52	10.67	1,181	2.47	2.60	686	1.43	1.31	218	0.45	0.54
Negri Sembilan	2,948	13.78	14.58	519	2.42	3.09	280	1.31	1.62	96	0.45	0.68
Pahang	3,634	21.90	22.33	317	1.91	3.09	111	0.67	0.92	172	1.04	2.59

INFANTILE MORTALITY.

39. There were 9,610 deaths of children under one year of age. The infantile mortality rate or rate per 1,000 births was 182.11; the rate for 1927 was 203.11.

INFANTILE MORTALITY TABLE.

State.	Deaths of children under one year of age.	Death-rate per 1,000 births.
Perak	3,691 ...	161.52
Selangor	3,041 ...	169.31
Negri Sembilan	1,443 ...	211.49
Pahang	1,435 ...	279.40

40. Deaths from zymotic diseases.

State.	Plague.	Cholera.	Small-pox.	Cerebro-spinal meningitis.
Perak	5 ...	— ...	— ...	1
Selangor	— ...	— ...	— ...	3
Negri Sembilan ...	— ...	— ...	— ...	3
Pahang	— ...	— ...	— ...	3

41. Death-rates from principal diseases for the last seven years.

Year.	Perak.			Selangor.			Negri Sembilan.			Pahang.		
	Malaria.	Dysentery and diarrhoea.	Pulmonary tuberculosis.	Malaria.	Dysentery and diarrhoea.	Pulmonary tuberculosis.	Malaria.	Dysentery and diarrhoea.	Pulmonary tuberculosis.	Malaria.	Dysentery and diarrhoea.	Pulmonary tuberculosis.
1922	12.29	1.42	1.83	9.96	2.39	2.00	11.51	2.40	1.69	12.10	0.74	0.84
1923	12.46	1.26	1.52	9.48	1.93	1.48	10.53	1.45	1.41	11.36	1.73	0.58
1924	10.66	1.20	1.50	7.40	1.67	1.36	10.50	1.32	1.52	14.59	1.41	0.50
1925	11.11	1.16	1.49	8.07	1.65	1.20	8.74	1.25	1.65	11.91	1.35	1.13
1926	13.35	1.57	1.52	10.96	2.65	1.14	13.65	1.48	1.74	—	—	—
1927	13.62	1.63	1.37	10.67	2.60	1.31	14.58	3.09	1.62	22.33	3.09	0.92
1928	12.50	1.31	1.33	10.52	2.47	1.43	13.78	2.42	1.31	21.90	1.91	0.67

42. Vital statistics for the four large towns, Kuala Lumpur, Ipoh, Taiping and Seremban.

Town.	Estimated population.	Births.		Deaths of persons who previous to decease had resided in town three months.	
		Number.	Rate per mille.	Number.	Rate per mille.
Kuala Lumpur	104,870	5,717	54.61	2,155	20.55
Ipoh	46,231	1,867	40.28	621	13.43
Taiping	22,249	1,170	52.58	803	36.09
Seremban	23,566	857	36.37	652	27.62

43. Table showing corrected death-rates in the four principal towns during the last seven years.

Year.	Kuala Lumpur.		Ipoh.		Seremban.		Taiping.	
	Population.	Death-rate.	Population.	Death-rate.	Population.	Death-rate.	Population.	Death-rate.
1922 ...	84,476	21.36	38,895	21.78	13,398	27.93	21,296	35.08
1923 ...	88,009	19.19	40,399	20.12	19,210	24.78	21,462	33.45
1924 ...	91,381	16.74	41,047	13.89	20,074	17.34	21,616	33.91
1925 ...	94,753	15.31	42,334	13.98	20,938	17.77	21,780	29.11
1926 ...	98,125	21.01	43,662	13.28	21,838	24.41	21,936	34.55
1927 ...	101,497	23.47	44,910	14.36	22,666	25.68	22,093	45.76
1928 ...	104,870	20.55	46,231	13.43	23,566	27.67	22,249	36.09

44. Table showing corrected deaths and death-rates from principal diseases.

Town.	Malaria.		Dysentery and diarrhoea.		Pulmonary tuberculosis.		Beri-beri.	
	Deaths.	Rate.	Deaths.	Rate.	Deaths.	Rate.	Deaths.	Rate.
Kuala Lumpur ...	224	2.14	242	2.31	158	1.51	36	0.34
Ipoh	62	1.34	32	0.69	64	1.38	8	0.17
Taiping	67	3.01	102	4.58	68	3.06	2	0.10
Seremban	159	6.74	64	2.72	51	2.16	12	0.51

45. Infantile mortality table:

Towns.	Estimated population.	Births.	Death under one year.	Rate per 1,000 births.
Kuala Lumpur ...	104,870 ...	5,717 ...	812 ...	97.25
Ipoh	46,231 ...	1,867 ...	151 ...	80.88
Taiping	22,249 ...	1,170 ...	207 ...	176.90
Seremban	23,566 ...	857 ...	263 ...	164.53

46. Table showing corrected death-rates from principal diseases in the four towns for the last seven years.

Year.	Kuala Lumpur.			Ipoh.			Seremban.			Taiping.		
	Malaria.	Dysentery and diarrhoea.	Pulmonary tuberculosis.	Malaria.	Dysentery and diarrhoea.	Pulmonary tuberculosis.	Malaria.	Dysentery and diarrhoea.	Pulmonary tuberculosis.	Malaria.	Dysentery and diarrhoea.	Pulmonary tuberculosis.
1922	2.79	2.18	3.33	4.50	1.62	2.54	10.44	5.92	6.35	5.45	1.50	1.74
1923	2.06	1.77	2.91	1.48	1.34	3.61	2.86	3.18	2.45	6.94	2.84	3.73
1924	1.13	1.53	2.66	0.97	1.00	1.51	2.89	1.54	1.89	5.41	2.91	3.47
1925	1.46	1.14	1.75	1.77	0.66	1.51	2.58	1.62	2.72	2.85	4.40	3.81
1926	1.10	1.82	1.36	1.12	0.87	1.08	3.61	2.79	2.24	3.56	5.24	3.37
1927	4.89	2.42	1.64	2.43	1.07	1.25	5.65	4.01	2.47	4.80	7.56	3.17
1928	2.14	2.31	1.51	1.34	0.69	1.38	5.18	2.70	2.17	3.01	4.58	3.05

MOSQUITO-BORNE DISEASES.

47. In Malaya, these are malaria, filariasis and dengue. Malaria is still very prevalent, filariasis is rare, dengue is frequently seen but is not of grave import.

MALARIA AND ANTI-MALARIAL MEASURES.

48. Malaria is still the chief cause of sickness and death in the Federated Malay States.

The number of deaths recorded during the year as due to fever was 20,053, giving a death-rate of 13.08 per mille population.

49. The Malaria Advisory Board of which the Chief Health Officer is Vice-Chairman met regularly during the year and its minutes were published in the Press.

50. The Mosquito Destruction Boards throughout the country continued their useful activities and the gospel of malaria prevention by mosquito reduction was preached as before and carried out in numerous localities.

51. The teaching of mosquitology, propaganda, investigations and research, anti-mosquito measures and quinine distribution were amongst the anti-malaria activities of the Health Branch.

52. Tablets of quinine to the number of 1,960,000 were distributed to the Health Officers for ultimate free distribution to the public through the District Officers, the Police, the Education Department and the Post Offices.

MEASURES TAKEN FOR PREVENTING THE INTRODUCTION AND SPREAD OF INFECTIOUS AND CONTAGIOUS DISEASES.

Port Health Work.

53. The Federated Malay States is afforded protection by three quarantine stations:

(*a*) The Island of Pulau Jerejak adjacent to Penang, which deals with the immigration for Indian labour for the northern Colonial Settlements, for Perak and for the Unfederated State of Kedah;

(*b*) St. John's Island close to the Port of Singapore, which deals with the vast amount of immigration from Southern China to Malaya; these two stations belong to the Straits Settlements;

(*c*) Port Swettenham is the gateway of immigration for Indian labour employed in Selangor and the adjoining portions of other States. Here also, measures are taken to prevent the introduction and spread of infectious and contagious diseases throughout the Federation.

Forty-six ships bringing a total of 19,840 immigrants and 6,342 deck passengers arrived at Port Swettenham. All ships were boarded and inspected, and immigrants and deck passengers passed into the Quarantine Camp. Seven ships were infected: four with small-pox, one with cholera, one with chicken-pox, and one with chicken-pox and cerebro-spinal meningitis.

Quarantine Maritime.

The Quarantine Camp, Port Swettenham, dealt with 21,259 immigrants and 6,455 deck passengers as follows:

	Immigrants.	Deck passengers.
Remaining, 31st December, 1927	1,419	113
Arrived	19,840	6,342
Total	21,259	6,455
Discharged to Depôt	21,138	6,447
Transferred to Hospitals outside	62	5
Absconded from Camp Hospital	1	3
Died	33	—
Remaining 30th December, 1928	25	—

Of the 19,840 immigrants arriving, 9,885 were adult males, 5,381 adult females, 1,685 minor males, 1,412 minor females and 1,477 infants.

Nineteen persons were admitted to the Camp from places within the State and 80 from the Labour Depôt.

The average daily number of immigrants in the camp was 507.

The largest number in one day, 10th November, 1928, was 1,366.

The percentage of deaths to total arrivals was 0.2 per cent.

Twenty-six thousand seven hundred and eighty-five were vaccinated against small-pox as follows:

Immigrants	20,074
Passengers	6,401
Public Works Department coolies, cooks, etc.	310
	26,785

Fifteen thousand seven hundred and forty-one immigrants received routine hook worm treatment.

The following is a comparative statement of immigrants passed through the Camp in the past three years. It will be noted that there is a very marked falling off in numbers for 1928 due to the depression in the rubber market:

	1926.	1927.	1928.
Remaining	1,408	1,697	1,419
Admitted	99,066	80,399	19,840
Total	100,474	82,096	21,259
Discharged	98,184	80,298	21,138
Transferred	104	61	62
Absconded	55	58	1
Died	457	260	33
Remaining	1,697	1,419	25

Quarantine Camp Hospitals.

The hospitals consist of special infectious and contagious disease wards and general wards.

The statistics for the hospitals are as follows:

Infectious Disease Wards.

Remained 31st December, 1927 ...	12
Admitted ...	68
Total ...	80
Discharged ...	79
Died ...	1
Remaining, 31st December, 1928 ...	0

There were no cases of cholera or plague.

The diseases treated were: small-pox, 1; cerebro-spinal fever, 1; chicken-pox, 18; measles, 41; mumps, 19.

The cause of the one death was cerebro-spinal fever.

General Wards.

Remaining 31st December, 1927 ...	98
Admitted ...	1,457
Total ...	1,555
Discharged ...	1,425
Transferred ...	70
Absconded ...	1
Died ...	34
Remaining, 31st December, 1928 ...	25

The common diseases treated were: influenza, conjunctivitis, diarrhoea, bronchitis, broncho-pneumonia, lobar pneumonia, intestinal parasites and skin affections.

The average daily number in hospital was 28.15.

The greatest number in one day (1st January, 1928) was 98.

Fifty-two patients were admitted from the Labour Depôt of whom one died.

Indians only were treated in the hospitals.

Of the total admissions 601 were dependants.

Thirty-eight minor operations were performed.

The causes of deaths were: broncho-pneumonia 19; lobar pneumonia 6; bacillary dysentery 21; marasmus 3; congenital debility, meningitis and gastro enterites one each.

The mortality was 2.7 per cent.

Of the 33 deaths, three were adult males, six adult females, one minor male, five minor females and 18 infants.

The camp and hospitals functioned satisfactorily.

Three two-roomed infectious disease wards for Europeans and two small Asiatic general wards were built. Improved facilities for the landing of immigrants and deck passengers nearer the Camp entrance were obtained.

Infectious Diseases outside the Quarantine Camp.

54. The following table shows the cases of infectious diseases reported and the State in which they originated:

State.	Plague.		Cholera.		Smallpox.		Diphtheria.		Cerebro-spinal meningitis.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Perak	5	5	—	—	—	—	16	1	1	1
Selangor ...	—	—	—	—	10	—	33	7	5	3
Negri Sembilan...	—	—	—	—	—	—	11	2	4	3
Pahang	—	—	—	—	—	—	—	—	3	3
Total ...	5	5	—	—	10	—	60	10	13	10

PLAGUE.

55. Five cases of plague occurred at Ipoh in Perak, all of which proved fatal.

CHOLERA.

56. It is satisfactory to report that no case occurred during the year in the Federated Malay States.

SMALL-POX.

57. Ten cases occurred during the year, these were all in the district of Ulu Langat in Selangor, there were no deaths.

DIPHTHERIA AND CEREBRO-SPINAL MENINGITIS.

58. Sixty cases of diphtheria with 10 deaths and 13 cases of cerebro-spinal meningitis with 10 deaths were reported during the year.

PULMONARY TUBERCULOSIS.

59. There were 1,977 deaths from pulmonary tuberculosis and the death-rate was 1.29 against 2,011 deaths and a death-rate of 1.34 in 1927.

With regard to the four States, Perak had a death-rate of 1.33 as compared with 1.37 in 1927, Selangor had 1.43 as compared with 1.31 Negri Sembilan had 1.31 as compared with 1.62, Pahang had 0.67.

Regarding the four large towns, Kuala Lumpur had a death-rate of 1.51 as compared with 1.64 in 1927, Ipoh 1.39 as compared with 1.25, Taiping 3.06 as compared with 3.17 and Seremban 2.17 as compared with 2.47.

HELMINTHIC DISEASES.

60. Cestodes, trematodes and nematodes occur, but the nematodes (round worms) are the class that are so generally important from a health point of view. About 90 per cent. of the native population harbour the ankylostoma in small numbers, few however show symptoms unless attacked by some concurrent disease such as malaria or dysentery when the complication may prove a very grave one. Ascariasis is even more universal and though not generally of serious import has been known to cause acute intestinal obstruction, and convulsions in children.

SCAVENGING, NIGHT-SOIL DISPOSAL, DRAINAGE, ETC.

COLLECTION AND DISPOSAL OF REFUSE.

61. In most towns the scavenging is fairly satisfactory. The best disposal is by incineration and this method should always be adopted if possible; dumping or the filling of swamps is not nearly so satisfactory. The accumulation of refuse due to prolonged wet weather hindering incineration, is often a cause of fly breeding.

Very careful supervision is required when the dumping of refuse is undertaken, otherwise extensive fly breeding will occur.

COLLECTION AND DISPOSAL OF NIGHT-SOIL.

62. No town in the Federated Malay States has as yet water carriage system of disposal, though certain schemes are under consideration for the future. A report by the Committee appointed, to advise "how and when a sewage system can best be installed in Kuala Lumpur" was submitted to Government early in the year; and consequent to the findings and recommendations of the Committee many more septic tank installations are being built both by the Government and private owners throughout the country.

Two large public latrines have been built on this system in Kuala Lumpur and are working satisfactorily.

63. The system in use in most towns is the two-bucket system for the shop-houses and the two bucket or deep pit latrines for bungalows standing in their own compounds. Most of the deep pit latrines form fly-breeding grounds and they are therefore unsatisfactory and are being rapidly replaced by the two-bucket system. Lime, petroleum and other larvicides are used in these pit latrines, but unless applied regularly do not prevent the breeding. The bucket system is being recommended for use on estates wherever possible in place of pit latrines. The ultimate disposal in the bucket system is by trenching.

DRAINAGE.

64. Street drainage is controlled by the Sanitary Board authorities. Anti-malarial drainage is controlled by the Mosquito Destruction Boards. The laying of sub-soil pipes in many areas was continued by the Anti-malaria Branch of the Public Works Department.

CLEARANCE OF BUSH.

65. This service is done on public lands by Sanitary Boards or Mosquito Destruction Boards. The clearance of bush in Malaya is not always a profitable proceeding for by doing so at the wet hill foots one will probably promote the propagation of *A. maculatus* (Theobald) our most powerful malaria carrier. In spite of the fact that notices pointing out this danger have been published in the press and in the form of posters, many a healthy area has been rendered intensively malarial by this clearance of bush.

WATER SUPPLIES.

66. Malaya being favoured with a very heavy annual rainfall, averaging about 100 inches, the majority of the towns have an ample supply of drinking water brought from uninhabited areas through pipes by gravitation. In some cases filters are employed, in others they have not been considered necessary. Slow sand filtration, and mechanical filters are both in use.

67. The necessity for keeping catchment areas as free from pollution as possible has long been recognised and efforts have been made to ensure these areas being kept clear of trespassers by having them gazetted as "Forest Reserves". The water supplies of all the large towns are examined monthly at the Institute for Medical Research, and the Kuala Lumpur water supply weekly.

68. Some estates have excellent supplies; others especially those in the coastal areas are not so fortunate, and schemes to improve the coastal supplies are under consideration.

PUBLIC HEALTH EDUCATION.

69. Exhibitions were held at the Horticultural Shows at Ipoh and Teluk Anson which were well attended, lectures were given and pamphlets which had been prepared by the Committee were distributed in large numbers in various languages.

70. Popular lectures on malaria was given in Malay and Chinese in various parts of the country, these were illustrated by lantern slides, and were well attended. Propaganda lectures on the dangers of venereal disease were also given.

71. A cinematograph film of work done at the Infant Welfare Centre, Kuala Lumpur, was also exhibited on several occasions to large and interested audiences of various nationalities.

SCHOOL INSPECTION.

72. The numbers of Government and State-aided schools in the Federated Malay States are as follows:

Government English Schools	23
Aided English Schools	26
Government Vernacular Schools—	
Boys	413
Girls	73

73. Besides the above there are a number of private schools. The duties of school inspection was shared with the Medical Branch, 590 visits being paid by officers of the Health Branch exclusive of the work of the Lady Medical Officer referred to below. Of the 26,485 children examined, 15.35 per cent. were found to have enlargement of the spleen, a much higher spleen rate being recorded in Negri Sembilan and Pahang than in Perak and Selangor. The sanitary condition of the schools and their surroundings was reported on at the time of the visit.

74. Each school has a stock of Government quinine which is issued free of charge to those scholars who require it.

75. A Lady Medical Officer was appointed early in the year for whole time school inspection in Selangor and routine inspections commenced on April 23rd, the number of schools inspected was 70, nine of these were English schools, one State Chinese, two Government Tamil and fifty-eight Malay, eleven of the Malay schools were for girls only, the others were mixed elementary schools.

Each school received two inspections and a report was made with regard to sanitation and defects found at time of inspection. The Lady Medical Officer was assisted by one trained Chinese Nurse, a thorough examination of each child was made, the record being kept on a school medical card; and the Infant Welfare Centres, Hospitals, and Travelling Dispensaries assisted in the treatment of such children as required attention.

Three thousand one hundred and fifty-one pupils were examined individually at first inspection, and at the second inspection 4,118 were examined of which the Lady Medical Officer considers that 3,946 = 95.9 per cent. were normal children (with no defect interfering with education). The number of defective children (defect interfering with education) was 172 = 4.1 per cent.

Lecture demonstrations were given twice a month to the assembled Malay women teachers, the subject being Pediculosis, Care of the Teeth, Skin Diseases, Worms and Malaria.

This systematic inspection of girls' schools is, I consider, a very valuable part of our health work and with the arrival shortly of another Lady Medical Officer for this special duty it is hoped to cover most of the schools in the four States during the current year.

MATERNITY AND CHILD WELFARE.

76. The Infant Welfare Centres at Kuala Lumpur, Ipoh, Taiping and Seremban were working satisfactorily during the year and a new Centre at Klang was opened in June which has already dealt with a large number of patients. The infantile mortality figures in all four States are substantially reduced this year.

77. A report on the work done at these Centres, and in the districts by the Health Visitors, is attached (Appendix "A").

WORK UNDER THE LABOUR CODE.

78. It is the duty of the employer of labour to engage the staff necessary for the protection of health and the cure of disease amongst his employees. The Health Branch co-operates with the Labour Department with the object of securing an adequate standard of sanitation where labour is employed.

79. The total number of estates sending in returns is 1,993 and the total number of estate hospitals is 203. Each of these estates should be visited at least twice yearly by the Health Officer of the district but this is unfortunately not always possible.

ESTATES.

80. Details of the distribution of estates and estate hospitals and the frequency of visits by Health Officers are given below:

State.	Health district.	Estates.			Estate hospitals.		
		No.	No. of visits by H.O.		No.	No. of visits by H.O.	
			1928.	1927.		1928.	1927.
Perak ...	Perak North	230	86	198	16	25	42
	Kuala Kangsar	124	74		10	13	
	Kinta	145	101	44	5	16	6
	Batang Padang	139	50	39	9	11	16
	Lower Perak	119	92		16	23	
Selangor ...	Selangor East	259	106	120	23	22	17
	Selangor Coast	224	131	152	34	34	35
	Bernam	5	6	7	2	2	1
Negri Sembilan ...	All districts...	412	236	146	44	29	38
Pahang ...	Pahang West	216	53	46	6	12	16
	Pahang East	120	161	52	6	16	12
	Total, F.M.S. ...	1,993	1,096	804	171	203	183

Supplementary visits were paid by Sanitary Inspectors.

81. The distribution of labour was as follows:

		Indians.	Others.	Total.
Perak	Larut, Matang and Krian	15,271	1,688	16,959
	Kuala Kangsar and Upper Perak ...	9,272	2,826	12,098
	Kinta	6,729	956	7,685
	Lower Perak ...	17,407	721	18,128
	Batang Padang ...	8,544	1,376	9,920
Selangor ...	Selangor East ...	21,775	4,968	26,743
	Selangor Coast ...	42,634	854	43,488
	Bernam	2,667	164	2,831
Negri Sembilan	All districts	27,291	14,946	42,237
Pahang ...	Pahang West ...	4,617	9,090	13,707
	,, East ...	386	3,692	4,078
	Total F.M.S. ...	156,593	41,281	197,874

82. The table below sets out the mortality rates among estate labourers during the past 18 years, that is, since the Health Branch took over the supervision of health conditions on estates:

Year.	Total number of estate labourers.	Deaths.	Death-rate per mille.
1911	143,614	9,040	62.9
1912	171,968	7,054	41.02
1913	182,937	5,592	29.6
1914	176,226	4,635	26.3
1915	169,100	2,839	16.78
1916	187,030	3,299	17.61
1917	214,972	3,906	18.71
*1918	213,425	9,081	42.55
1919	216,573	3,384	15.16
1920	235,156	4.367	18.57
1921	175,649	3,195	18.19
1922	159,279	2,556	16.05
1923	147,276	1,924	13.06
1924	144,902	1,514	10.45
1925	146,558	1,585	10.81
†1926	181,204	2,632	14.53
1927	207,086	3,619	17.48
1928	195,961	2,953	15.07

* Influenza year. † Excluding Pahang.

83. There were 2,508 deaths among the Indian estate labourers during the year, giving a mortality rate of 15.98 per mille as against 2,982 deaths and a death-rate of 17.44 per mille in 1927.

84. Return of malaria admissions and deaths of Indian labourers and others in estates and Government hospitals.

Divisions.	Malaria admssions to estates and Govt. hospitals.	Malaria deaths in estates and Govt. hospitals.	Total admissions to estates and Govt. hospitals.	Total labourers employed, all nationalities.	Total deaths.	Death-rate per mille.	Indians employed.	Deaths, Indian labour force.	Death-rate, Indian labour force.	Number of estates.	Number of estate hospitals.
Larut, Matang and Krian ...	1,934	85	6,720	16,959	173	10.20	15,271	165	10.80	186	16
Kuala Kangsar and Upper Perak	2,600	62	6,380	14,209	201	14.15	10,961	180	16.42	169	10
Kinta	1,245	42	3,220	7,685	63	8.20	6,729	61	9.07	145	5
Lower Perak ...	3,026	82	9,926	18,128	178	9.81	17,407	174	9.99	117	16
Batang Padang ...	1,052	17	3,206	10,120	93	9.19	7,952	91	11.44	144	9
Selangor East ...	6,720	173	16,024	26,745	445	16.64	21,325	424	19.88	259	23
Do. Coast ...	6,130	162	15,384	43,488	476	10.95	42,334	474	11.19	224	34
Bernam	149	8	739	2,831	21	7.41	2,667	21	7.87	5	2
Negri Sembilan	11,954	471	20,721	42,237	922	21.83	27,291	754	27.63	412	44
Pahang West ...	3,212	109	5,193	9,916	319	32.17	4,617	157	34.00	216	6
Pahang East ...	1,781	10	5,599	3,643	62	17.02	386	7	18.13	120	6
Total ...	39,803	1,221	93,112	195,961	2,953	15.07	156,940	2,508	15.98	1,997	171

MINES.

85. The estimated population employed in mining during the year was 109,141 as against 122,888 in 1927, a decrease of 13,747. Mines are not required to send in sickness and death returns and the sick-rates and death-rates are not known.

FEDERATED MALAY STATES RAILWAYS.

86. Health conditions both on "open lines" and on "construction" were generally satisfactory; malaria however being as in previous years, the chief cause of sickness.

Permanent anti-malarial works were carried out at many stations and ten oiling gangs were employed throughout the year.

87. Close liaison was maintained between the Health Office, Railways, and various Mosquito Destruction Boards and estates where oiling was in force up to the railway boundary, by this it was ensured that no dangerous focus was left in a protected area, the Railway Department when not doing the work themselves, arranging to pay the Board or Estate concerned for oiling, etc., within the railway boundary.

88. Quinine tablets to the number of 186,943 were distributed to the staff on open lines and on construction works.

89. A staff of four Health Inspectors and 22 Dressers in charge of Railway Dispensaries was maintained.

GENERAL.

Chinese Decrepit Camp.

90. This temporary Camp at Port Swettenham was administered during the year by the Health Branch; and provides a home for aged Chinese and others unable to earn their own living due to disability, etc.

The numbers dealt with in the Camp were:

	Perak.	Selangor.	Negri Sembilan.	Pahang.	Total.
Remaining, 31st December, 1927	100	58	28	—	186
Admitted	3	2	—	—	5
Total	103	60	28	—	191
Discharged	—	—	1	—	1
Transferred	2	—	2	—	4
Absconded	5	—	—	—	5
Died	9	5	—	—	14
Remaining, 31st December, 1928	87	55	25	—	167

The average daily number of inmates was 176.83.

The percentage of deaths to total inmates was 7.33.

A number of the men are employed in making coir and rottan articles, such as brooms and baskets and earn a little money in this way with which they buy extras such as tobacco, etc., for themselves.

The Camp functioned very satisfactorily during the year and the inmates were happy and contented.

Health Boards Enactment.

91. Under the Health Boards Enactment, 1926, it is proposed to organise medical and hospital services on estates so as to give them generally the regular systematic supervision and hospital facilities they need for efficient sanitation, anti-malaria and other preventive measures and treatment of the sick.

Local Boards have been formed in each district and in the latter half of the year suggested proposals were put forward by the Health Branch for consideration by the Local Boards. These schemes will ultimately come before the Central Health Board for final approval.

The Central Health Board of which the Chief Health Officer is a member ex-officio met on several occasions during the year, as did also the Organisation and Finance Sub-Committees.

Co-operation with the Public Works Department.

92. The Health Branch has endeavoured to keep in close touch with the Public Works Department as regard new works and undertakings where large numbers of coolies are employed and efforts are made to ensure that as far as possible the labourers are housed in a "sanitary area" where anti-malaria measures are being taken and that they are provided with a potable water supply and a satisfactory system of latrines. In several large undertakings which are now in hand, this co-operation has been very successful indeed.

Cameron's Plateau (4,750 feet).

93. The work continued in making the road to the Plateau during the year, the population rose from 902 in December, 1927, to 3,465 in December, 1928. The average monthly population during the year was 2,656 composed of 2,513 male adults, 80 female adults and 60 children.

These were employed largely by the Contractors but also by the Public Works Department and the Agricultural Department, Federated Malay States. All nationalities are included in these figures except Sakai. During the year there were 392 admissions to Tapah Hospital with 23 deaths, and nine deaths occurred outside hospital.

Two Health Inspectors are stationed on the road some miles apart they are in charge of the anti-malarial work, oiling, ditching, etc., and supervise the general sanitation of the living quarters of the labour force, the cattle sheds and other buildings along the road.

The Health Officer, Batang Padang, stationed at Tapah, is in charge of all preventive measures in connection with Cameron's Plateau.

Perak Hydro-Electric Company.

94. A large labour force is employed by this company on its works at Chendroh on the Perak River and periodical visits are paid to the Camp at the dam site by officers of this Branch.

International Sanitary Convention.

95. The effective date of the accession of the Federated Malay States Government to the International Sanitary Convention of Paris (1926) was the 9th of October, 1928, and steps are being taken to bring the Quarantine and Prevention of Disease Enactment into line with the Convention.

Kuala Lumpur,
5th March, 1929.

A. K. COSGRAVE,
Acting Chief Health Officer, F.M.S.

Appendix "A".

ANNUAL REPORT OF THE INFANT WELFARE CENTRES IN THE FEDERATED MALAY STATES FOR THE YEAR 1928.

Infant welfare work started in the Federated Malay States in Kuala Lumpur the Capital, in 1922. Centres were opened later in Ipoh and Taiping in Perak, Seremban in Negri Sembilan and in June, 1928, at Klang, Selangor.

Previous to this year the work of each Centre has been published as a separate report but as there are five Centres working now it was decided to submit a general report.

The Centres all started in a small way: a shop-house was rented, certain alterations made and the work commenced; some of the Centres, viz., Kuala Lumpur and Ipoh have now much more commodious buildings.

The personnel of a Centre usually consists of a Lady Medical Officer;
European Sisters trained in health work;
Asiatic trained health visitors or Nurses;
Amahs or ayahs;
Dispenser;
Dresser (Laboratory Assistant for minor pathological examinations);
Toti (sweeper);
Peon (messenger);
Motor bus driver;
Clerk;

the members of the staff depending on the size of the Centre.

Each Centre has a 'bus attached to it. This vehicle has a fixed itinerary and visits outlying districts and villages and brings in the poorer type of patient who cannot afford transport. These buses are a very useful aid to the work at each Centre, and during the year brought 54,472 patients to the various Centres.

The Lady Medical Officers in charge of the various Centres during the year were:

Perak.

Ipoh—
Dr. (Mrs.) L. J. Bentinck, 1st January, 1928, to 18th April, 1928.
Dr. (Mrs.) C. V. Burne, 14th May, 1928, to 31st December, 1928.

Taiping—
Dr. (Mrs.) E. B. Jacques, 1st January, 1928, to 25th March, 1928.
Dr. (Mrs.) E. M. M. Cobb, 26th March, 1928, to 28th June, 1928.
Dr. (Mrs.) E. B. Jacques, 29th June, 1928, to 31st December, 1928.

Selangor.

Kuala Lumpur—
Dr. (Mrs.) M. E. Hopkins, 1st January, 1928, to 30th June, 1928.
Dr. (Mrs.) L. M. Bush, 1st July, 1928, to 31st December, 1928.

Klang—
Dr. (Mrs.) M. J. Were, 4th January, 1928, to 31st December, 1928.

Negri Sembilan.

Seremban—
Dr. (Mrs.) E. M. M. Cobb, 1st January, 1928, to 25th March, 1928.
Dr. (Miss) V. E. K. Stuart, 26th March, 1925, to 31st December, 1928.

WORK AT A CENTRE—INDOOR.

The work performed is ante-natal, post-natal and also that of a Women's and Children's Outdoor Dispensary. The card-index system of registering patients is adopted.

Advice is given to any pregnant women who attends the Centre, a brief examination is made and anything abnormal noted for future reference, an obstetrical packet is given to any poor expectant mother who asks for it. Accommodation is arranged in hospital for such women as desire to enter.

Babies on arrival at a Centre are undressed, weighed and seen by the Lady Medical Officer, the mothers are taught the elements of hygiene by means of posters and lectures, the elder children are instructed how to wash their hands before meals and how to brush their teeth. A table fitted up with feeding bottles, utensils and spoons such as are found in a native home, is always ready and demonstrations in feeding and the preparing of food are given to the mothers.

The fat soluble A and water soluble B vitamin being necessary for growth and development, and the vitamin C to prevent scurvy, supplies of these are given daily to marasmic infants in the form of an emulsion consisting of cod liver oil, marmite and orange juice, it is also given to nursing mothers. Liberal use is made of extract of rice polishing for suitable cases.

Outdoor dispensary patients are dealt with and serious cases are advised hospital treatment and if this is accepted they are provided with transport and an admission letter.

HEALTH VISITING IN THE HOMES.

This work has developed greatly during the year, Health Visitors both European and Asiatic paying visits to houses in the towns and villages. The work is not easy, as it entails a lot of walking in areas where transport cannot penetrate and also much searching for dwellings the address of which given is often extremely vague.

Great friendliness has been shown to the Health Visitors and the Sisters are often stopped in the streets and asked to visit new-born babies. Improvement in the ventilation and cleanliness in the Homes has been noticed.

The language difficulty in dealing with patients of various nationalities is at times somewhat marked but with the Lady Medical Officers and European Sisters speaking Malay and the Health Visitors being able to talk either a Chinese dialect or Tamil in addition to English and Malay, this difficulty has been largely overcome, especially as some other patient can often be utilised as an interpreter if necessary.

EDUCATION AND PROPAGANDA.

An Infant Welfare Exhibit was arranged at the Malayan Agri-Horticultural Show held for the time in Ipoh in August. In previous years the exhibit had been held in Kuala Lumpur.

The exhibit was divided into two main groups, the first containing sections concerning the care of the baby before birth, during birth and in infancy; the second having sections of a more specialised kind referring to feeding, care of the teeth and elementary hygiene. Many exhibits and new posters were displayed and explained. The Exhibition was well attended by all classes and nationalities and much interest was shown.

A Baby Show was held at the newest opened Centre in Klang on December 9th and was a great success. It had been well advertised by means of Press advertisements, coloured posters and placards throughout the town, coloured slides at the cinemas, distribution of handbills and flashing electric light signs. There were no less than 470 competitors and it was no easy matter to decide on the prize winners in the various classes. These baby shows are excellent propaganda for a Centre when it is newly opened, and before it has a well established reputation in the district, previously they had been held in Kuala Lumpur and Ipoh.

A very interesting set of photographs taken at the Infant Welfare Centre, Klang, under supervision of the Lady Medical Officer in charge are attached. The photos are self explanatory and show the shop-house, the bus, the staff at work, the types of patients and the general activities at the Centre.

I attach a return giving the summarised number of patients which attended the five centres, this return shows in detail the work at the Centres and in the districts amongst some of the women, children and infants of the Federated Malay States.

A. K. COSGRAVE,
Acting Chief Health Officer, F.M.S.

MATERNITY AND CHILD WELFARE WORK DONE AT THE INFANT WELFARE CENTRES, FEDERATED MALAY STATES, DURING THE YEAR 1928.

Nature of work.	
1. Total No. of Clinics held	2,473
2. ,, Attendances of Mothers...	20,255
3. ,, Attendances of Infants up to one year	34,406
4. ,, Attendances of Children from 1 to 12 years ...	44,399
5. ,, Attendances of other cases	11,140
6. Grand Total of Attendances	118,257
7. No. of New Infants attended	8,848
8. ,, Children ,, ...	18,452
9. ,, Mothers ,, ...	7,069
10. ,, Other cases seen	6,473
11. No. of Infants—Normal, general advice given	6,551
12. No. of Children—Normal, general advice given	6,260
13. No. of Infants suffering from incorrect feeding	2,314
14. No. of Infants suffering from malnutrition	615
15. No. of Infants suffering from congenital syphilis	211
16. No. of Infants suffering from rickets	32
17. No. of Cases of Worms—	
(*a*) Women	3,301
(*b*) Children	22,171
18. No. of Cases of Malaria—	
(*a*) Women	2,067
(*b*) Children	5,443
19. No. of Cases of Beri-beri—	
(*a*) Women	527
(*b*) Children	8
20. No. of Cases of Other Diseases—	
(*a*) Women	16,453
(*b*) Children	31,533
21. No. of Ante-Natal Mothers seen by Doctor	1,606
22. No. of Post-Natal Mothers seen by Doctor	455
23. No. of Mothers (Others) seen by Doctor	14,091
24. No. of Infants seen by Doctor ...	17,916
25. ,, Children seen by Doctor ...	26,076
26. ,, Infants weighed	14,867
27. ,, Cases referred to Private Doctors	6
28. ,, ,, Sent to Hospital... ...	1,326
DISTRICT WORK.	
29. No. of Visits paid by Sisters to—	
(*a*) Expectant Mothers	1,329
(*b*) Infants...	9,057
(*c*) Children aged 1 to 12 years ...	10,684
30. No. of Visits paid by Health Visitors to—	
(*a*) Expectant Mothers	2,571
(*b*) Infants	21,115
(*c*) Children aged 1 to 12 years ...	26,875
31. No. of patients brought by transport...	54,472

—	Monthly total of nationalities.	
	New cases.	Repeat cases.
MALAYS—		
Infants	1,649	5,462
Children ...	4,228	8,922
Women... ...	4,104	7,156
Total ...	9,981	21,540
CHINESE—		
Infants	4,933	14,751
Children ...	8,021	18,316
Women... ...	4,823	6,298
Total ...	17,777	39,365
TAMILS—		
Infants	2,028	4,325
Children ...	5,691	5,443
Women... ...	3,889	3,493
Total ...	11,608	13,261
OTHERS (Europeans, Eurasians, Bengalis, Japanese, Javanese, Siamese, etc.)—		
Infants	338	835
Children ...	706	1,263
Women... ...	641	942
Total ..	1,685	3,040
GRAND TOTAL ...	41,051	77,206
	=118,257	

NOTE.—A post-natal mother is one requiring an examination within a month or six weeks after labour with a view to detecting if unobserved injury has resulted from her confinement.

Appendix C.

REPORT OF THE REGISTRAR-GENERAL OF BIRTHS AND DEATHS, FEDERATED MALAY STATES, FOR THE YEAR 1928.

The records of births and deaths indicate that the registration of births and deaths in each of the four States is up to date.

2. The arrangements to have the registers which were lost in the Pahang floods, 1926, rewritten from the original certificates which had been received in this office prior to the flood is about half completed and will be finished during the year.

3. The leaves forming the original registers of births and deaths which were received were bound in the office.

4. I attach a schedule of vital statistics.

Kuala Lumpur,
5th March, 1929.

A. K. COSGRAVE,
Registrar-General, Births and Deaths,
Federated Malay States.

FEDERATED MALAY STATES.

ESTIMATED POPULATION OF ALL RACES OF EACH STATE AND FOR THE WHOLE OF THE FEDERATED MALAY STATES FOR 1928.

States.	Europeans and Americans.	Eurasians.	Malays and other races of the Archipelago.	Chinese.	Indians.	Others.	Total.
Perak	2,519	1,066	268,196	229,937	171,493	1,968	675,179
Selangor	3,278	1,843	111,242	185,027	174,942	2,233	478,565
Negri Sembilan ...	1,250	559	83,378	82,809	44,830	1,145	213,971
Pahang	382	143	113,227	41,217	10,202	726	165,897
Total, F.M.S. ...	7,429	3,611	576,043	538,990	401,467	6,072	1,533,612

SUMMARY OF BIRTHS AND DEATHS FOR THE YEAR 1928.

Births.

States.	Europeans and Americans.	Eurasians.	Malays and other natives of the Archipelago.	Chinese.	Indians.	Others.	Total.	Rate per mille of population.
Perak	57	33	10,156	7,872	4,698	35	22,851	33.84
Selangor ...	82	66	4,925	7,603	5,262	23	17,961	37.53
Negri Sembilan	6	26	3,574	2,144	1,066	7	6,823	31.89
Pahang ...	3	2	3,387	1,448	289	7	5,136	30.96
Total, F.M.S.	148	127	22,042	19,067	11,315	72	52,771	34.41
Deaths.								
Perak	15	12	5,560	7,513	5,113	43	18,256	27.04
Selangor ...	19	21	2,316	5,849	5,665	23	13,893	29.03
Negri Sembilan	4	13	2,348	2,146	2,528	11	7,050	32.95
Pahang ...	3	2	4,181	1,401	642	9	6,238	37.60
Total, F.M.S.	41	48	14,405	16,909	13,948	86	45,437	29.63

FEDERATED MALAY STATES.

RETURN OF DEATHS OF ALL AGES FROM PRINCIPAL DISEASES FOR 1928.

States.	Plague.	Cholera.	Small-pox.	Cerebro-spinal meningitis.	Diphtheria.	Typhus (tropical).	Yellow fever.	Malaria (including fever).	Blackwater fever.	Dysentery and diarrhoea.	Phthisis (pulmonary tuberculosis).	Pneumonia.	Beri-beri.	Enteric (typhoid).	Syphilis.	Ankylostomiasis.	Tetanus.	Cancer (including Sarcoma).	Bright's disease.	Influenza.	Ptomaine poisoning.	Convulsions.	Deaths from other diseases.	Children under one year.	Persons between 20-40.	Persons over 60.	Persons of other ages.	Total No. of deaths.
Perak	5	...	...	1	1	...	...	8,438	2	883	900	841	134	15	73	72	22	7	37	20	34	1,865	4,906	3,691	4,270	2,450	7,845	18,256
Selangor	...	...	...	3	7	...	...	5,033	6	1,181	686	1,133	218	7	28	83	16	14	15	24	105	1,924	3,410	3,041	4,134	1,305	5,413	13,893
Negri Sembilan ...	...	...	...	3	2	...	...	2,948	6	519	280	672	96	8	18	32	7	7	93	16	8	831	1,504	1,443	2,151	625	2,831	7,050
Pahang	...	...	...	3	...	1	...	3,634	2	317	111	247	172	7	9	67	2	9	2	2	...	591	1,062	1,435	1,502	589	2,712	6,238
Total, F.M.S. ...	5	...	...	10	10	1	...	20,053	16	2,900	1,977	2,893	620	37	128	254	47	37	147	62	147	5,211	10,882	9,610	12,057	4,969	18,801	45,437

Appendix D.

ANNUAL REPORT OF THE CHIEF SURGEON, PERAK, FOR THE YEAR 1928.

Buildings.—The new theatre block for Ipoh District Hospital was commenced in August.

The Batu Gajah European Theatre was remodelled during the year.

Staff.—An Assistant to the Chief Surgeon was appointed in April. Dr. Bearblock held the appointment till November when he was succeeded by Dr. Chitty.

Visits of the Chief Surgeon outside Ipoh for consultation or operation were as follows:

To Taiping	27
To Kuala Kangsar	3
To Batu Gajah	109

Total major operations in Ipoh were 324. In Taiping and Batu Gajah (Europeans only) the numbers were 14 and 20, respectively.

On one occasion an urgent operation was performed on a European in the District Hospital, Ipoh, as the condition would not admit of transfer to Batu Gajah.

Close co-operation between the Surgical and Radiological Departments has provided much interesting gastric and urological work; and the use of surgical diathermy, under the supervision of the Radiologist, for superficial malignant growths, is extending.

Analysis of the major operations performed in Ipoh District Hospital is appended.

T. W. H. BURNE,
Chief Surgeon, Perak.

IPOH HOSPITAL.

Total major operations	324
Total deaths following major operations	52
Percentage	16.04
Emergency operations	99
Death following emergency operations	31
Percentage	31.31
Interval operations	225
Death following interval operations	21
Percentage	9.13
Total minor operations	732

REGIONAL CLASSIFICATION OF MAJOR SURGICAL OPERATIONS FOR 1928.

Head and Neck—

Keloid ear—excision	1
Carcinoma of thyroid—excision	2
Sarcoma maxillary—excision	3
Dentigerous cyst—excision	1
Myeloma of right superior maxilla—excision	1
Sarcoma of alveolus (mandible)—local excision	1
Mastoiditis—Heath's mastoid operation	15
Harelip—plastic operation	6
Cut throat—suture	1
Fracture of skull—trephining	7
Suppurative maxillary antrum—sequestrectomy	1
Osteomyelitis mandible—sequestrectomy	1

Carotid aneurism—ligature of common carotid	1
,, ,, evacuation of sac	1
Tumour of head—ligature of vessels	2
Chronic orbital abscess—drainage	1
Thyroid adenoma—ligature of thyroid artery	2
Foreign body (toothplate)—lateral oesophagotomy	1
Cervical adeno sarcoma—excision	2
Suppurative adenitis—incision and curettage	1
Fistula of Stenson's duct—plastic repair	1

Upper Limbs—

Laceration hand—disarticulation at wrist	1
Crushed fingers—disarticulation of fingers	2
Gangrene arm—amputation arm	2
Malunited fracture arm—amputation upper arm	2
Compound fracture of humerus with simple fracture ulna—plating and wiring	1
Compound fracture of arm—setting	4
Webbed fingers—repair	1
Malunited fracture arm—applying steel band	2
Unreduced dislocation of left shoulder—excision head of humerus	1
Malignant tumour of Scarpa's triangle—excision	2

Lower Limbs—

Ulcers legs—skin grafting	4
Compound fracture tibia and fibula—setting	3
,, ,, of tibia—applying steel band	3
Simple fracture of tibia—(open operation) setting	2
Un-united compound fracture humerus—autogenous medullary bone graft	1
Compound fracture ankle (septic)—amputation leg	3
,, ,, tibia and fibula—sequestrectomy	2
Fracture patella—suture with antogenous fascial graft	2
Gangrene ulceration toes—disarticulation	3
Epithelioma foot—diathermy and removal of secondary inguinal glands	1

Thorax—

Clinical carcinoma of breast—excision	1
Submaxillary sarcoma—excision	1
Lipoma and congenital cyst chest—excision	2
Empyema—resection of rib	1

Abdomen and Pelvis—

Splenomegaly—splenectomy	2
Cholecystitis—cholecystectomy	1
Cholelithiasis—cholecystectomy	1
Gangrenous cholecystitis—choledochostomy and partial cholecystectomy	1
Duodenal ulcer—posterior gastro-enterostomy	16
Gastric ulcer—posterior gastro-enterostomy	1
,, ,, anterior gastro-enterostomy	1
Pyloric obstruction (complete)—jejunostomy	1
Perforated gastric ulcer—suture and drainage	1
Gangrenous volulus of sigmoid colon—anastomosis after resection	1
Volulus of intestine—released	1

Intestinal obstruction—colostomy	2
,, ,, with peritonitis—drainage	2
General peritonitis—laparotomy with drainage	9
,, peritonitis with closure of perforated gut (ulcer)—drainage	2
Tuberculous peritonitis oxygen injection	4
Ruptured small intestine—suture and drainage	1
Stab wound of the bowel—suture and drainage	2
Gangrene of intestine—anastomosis after resection of 10′ of gut	1
Gangrenous volulus—anastomosis after resection	1
Ileal intussusception—anastomosis after resection	1
Rupture of ileum, kidney and mesentery—suture and drainage	1
Malignant growth of ileo-coecum and mesentery—short circuit	1
Iliac abscess—incision and drainage	1
Gangrenous appendicitis—appendicectomy	5
Acute appendicitis—appendicectomy	24
Purulent colitis—appendicostomy	1
Retro-colic abscess—drainage and appendicectomy	1
Appendix abscess—drainage and appendicectomy	4
Liver abscess—drainage and appendicectomy	2
Peri-nephric abscess—drainage	2
Perforation of fundus of uterus—drainage	1
Subcapsular haematoma of spleen (traumatic)—exploratory laparotomy	1
Rupture of spleen—removal of spleen	1
Fracture dislocation of spine—laminectomy	1
Extra peritoneal rupture of bladder—drainage	2
Chronic retro-peritoneal abscess—drainage	2
Umbilical fistula and intra-abdominal abscess-curettage	1
Reducible inguinal hernia—herniotomy	28
Obstructed inguinal hernia—herniotomy	6
Strangulated inguinal hernia—herniotomy	9
Ventral hernia—repair	1
Dystocia-caesarian section	2
Ruptured ectopic gestation—excision sac	3
Ovarian cyst—ovariotomy	12
Double cystic ovaries and right hydrosalpinx—hysterectomy and ovariotomy	1
Prolapse of uterus—Gilliam's suspension	1
Ovarian haemorrhage—ovariotomy and drainage	1
Tumour of uterus and right extra-uterine pregnancy	1
Right pyosalpinx	2
Impacted stone in ureter—uretero-lithotomy	1
Supra-vaginal hysterectomy	1
Supra-pubic lithotomy	4
Placental polypus	1
Cystoscopy with ureteral catheterisation	2
Imperforate hymen	1

Perineum—

Multiple urinary fistulae—external urethrotomy	3
Stricture urethra—external urethrotomy	8
Urethral calculus—external urethrotomy	2
Meatal obstruction—external urethrotomy	1
Fistula in ano—excision	14
Imperforate anus—repair	1
,, ,, colostomy	2
Epithelioma of penis—total amputation of penis and removal of inguinal glands	2
Gumma testis—castration	1
Hydrocele—radical cure	7
Papillomata of vulva and anus—excision	3
Faecal fistula groin—repair	1

ANAESTHETICS.

Major—	
General	276
Spinal	19
Local	29
Total	324
Minor—	
General	94
Spinal	8
Local	94
Total	196

Although there has been no fatality which can be attributed to anaesthesia during the year, the administration in most cases is not satisfactory. Rule of thumb methods are used and no variation is made for variable factors.

DEATHS FOLLOWING MAJOR OPERATIONS.

Condition.	Operation.	Cause.	No.
General peritonitis cause unknown	Drainage	Toxaemia	4
General peritonitis perforation fundus uteri	,,	,,	1
General peritonitis appendicular origin	Drainage and appendicetomy	,,	5
General peritonitis perforation of enteric ulcer	Drainage and suture	,,	2
General peritonitis perforation of gastric ulcer	,, ,,	,,	1
General peritonitis perforation of duodenal ulcer	,, ,,	,,	1
General peritonitis perforation other ulcer	,, ,,	,,	1
Gangrenous cholecystitis	Cholecystectomy	,,	2
Gangrene of small intestine	Resection	Shock	1
Tuberculous peritonitis	Drainage	General peritonitis and Toxaemia	3
Tuberculosis of caecum and appendix	,,		1
Subacute appendicitis	Drainage and appendicectomy	,,	1
Rupture of kidney ileum and mesentery	Exploratory laparotomy	Shock and haemorrhage	1
Intestinal obstruction and pelvic peritonitis	Drainage	Toxaemia	1
Faecal fistula and appendicitis	Appendicectomy and repair	Pulmonary embolism	1
Gangrenous volvulus of sigmoid	Partial colectomy	Toxaemia	1
Intestinal obstruction	Colostomy	,,	2
Wound of small intestine	Suture and drainage	General peritonitis	1
Imperforate anus	Colostomy	Shock	2
Cut throat	Suture	Asphyxia	1
Liver abscess	Drainage	Amoebiasis-exhaustion	1
Extraperitoneal rupture of bladder	,,	Shock	1

Condition.	Operation.	Cause.	No.
Carcinoma of stomach	Ant. gastroenterostomy	Cachexia	1
Perforation of pyloric carcinoma	,, ,, ...	,, ...	1
Pyloric obstruction (complete)	Jejunostomy	General peritonitis ...	1
Fracture of vault of skull ...	Trephining	Shock and haemorrhage	3
Ruptured ovarian cyst. Fibroid uterus	Ovariotomy and hysterectomy	Shock	1
Chronic intussusception ...	Resection	,, ...	1
Ileocaecal carcinoma	Short circuit	Cachexia	1
Pyosalpinx	Excision	General peritonitis ...	1
Urethral stricture	External urethrotomy	Toxaemia (cystitis) ...	1
Umbilical fistula and intra-adominal abscess	Curetting	General peritonitis ...	1
Carcinoma of rectum	First stage of excision	Shock	1
Chronic septic compound fracture of leg	Amputation	Septicaemia ...	1
Compound fracture of humerus	Fixation with plate and wire	,, ...	1
Epithelioma of penis	Total amputation and excision of glands	,, ...	1
Dentigerous cyst	Excision	Septic pneumonia ...	1

APPENDIX E.

ANNUAL REPORT OF THE CHIEF SURGEON, SELANGOR, FOR THE YEAR 1928.

There has been a steady increase in the surgical work of Kuala Lumpur during 1928.

The total number of major operations performed was 498, and the total number of minor operations 790.

The following figures show the number of major operations performed at the various hospitals in Kuala Lumpur during the past four years:

	1925.	1926.	1927.	1928.
European Hospital	34	46	75	90
General Hospital	152	198	306	375
District Hospital	71	71	45	33

Of the 498 major operations performed during 1928—there were 35 deaths making a percentage of 7.03.

SYNOPSIS OF MAJOR OPERATIONS DURING 1928.

I.—AT THE EUROPEAN HOSPITAL.

	Total.	Deaths.	Remarks.
(a) *Abdominal*—			
Exploratory laparotomy	5	—	Freeing of adhesions 2
Appendicectomy:			
Without drainage	21	—	
With drainage	2	1	One death from complication of portal pyaemia
Excision of Meckel's diverticulum	1	—	Acutely inflamed
Drainage operation for general peritonitis	1	1	Peritonitis following previous cholecystectomy
Cholecystectomy	2	—	
Lumbar nephrectomy	1	—	
Ovariotomy	2	—	For ovarian dermoid 1
Hysterectomy	1	—	For multiple fibro-myomata
Caesarean section	1	—	
Gilliam's operation for uterine displacements	7	—	
Radical cure inguinal hernia	4	—	
Operations for strangulated internal hernia	1	1	With resection gangrenous intestine
(b) *Perineal*—			
Operations for haemorrhoids	6	—	
Operations for fistula in ano	3	—	
Operations for fissure in ano	2	—	
(c) *Limbs*—			
Amputation—Syme's	1	—	For diabetic gangrene
Operations for hallux valgus	1	—	
Excision semilunar cartilage knee	3	—	
Ligature operation for varicose veins	1	—	

AT THE EUROPEAN HOSPITAL—(*cont.*)

	Total.	Deaths.	Remarks.
(*d*) *Various*—			
Excision of glands	2	—	
Partial excision of lips for epithelioma	1	—	
Partial excision tongue for new growth	1	—	
Excision of adenoma of thyroid	1	—	
Enucleation of tonsils	7	—	
Dilatation and curettage	11	—	
Operation for varicocele	1	—	

II.—AT THE GENERAL HOSPITAL.

(*a*) *Abdominal*—			
Stab wounds:			
With perforation of intestine	2	1	Died of general peritonitis
With prolapse of viscera	1	—	
Posterior gastro-jejunostomy	12	1	For chronic gastric ulcer 6. For chronic duodenal ulcer 5 With acute perforation and general peritonitis 1
Anterior gastro-jejunostomy	1	—	For very large adherent ulcer on posterior wall
Suture perforated chronic gastric and duodenal ulcers and drainage general peritonitis	2	—	One perforated 36 hours
Partial gastrectomy	2	2	For advanced carcinoma of stomach
Gastrostomy	1	—	
Appendicectomy:			
Without drainage	13	—	
With drainage for general peritonitis	4	—	Gangrenous appendix in hernial sac. I
Drainage operation for localised appendix abscess	4	—	
Drainage operation for general peritonitis	4	—	
Drainage operations for pelvic peritonitis	3	—	
Operations for acute intestinal obstruction:			
By bands	1	1	
By adhesions	1	—	
By volvulus	3	3	All with gangrenous intestine
Operation for intussusception	3	2	One death after resection and intestinal anastomosis. All late cases
Operations for traumatic rupture of intestine	1	1	Rupture of jejunum 18 hours with advanced general peritonitis
Exploratory laparotomy	9	—	For inoperable carcinoma
Cholecystostomy	2	—	
Cholecystectomy	4	1	For gangrenous cholecystitis, 3; for chronic cholecystitis with gallstones, 1
Drainage operation for liver abscess	1	—	

General Hospital—(*cont.*)

	Total.	Deaths.	Remarks.
Drainage operation for acute haemorrhagic pancreatitis	1	1	
Operation for pancreatic cyst	1	—	
Splenectomy	7	2	For traumatic rupture of spleen 5. For splenomegaly 2
Salpingo-oophorectomy for ruptured ectopic gestation	3	1	One with bilateral ectopic gestations of different ages. The one death from large intraperitoneal flooding
Salpingo-oophorectomy	1	—	
Salpingectomy	3	—	For pyosalpinx 2
Caesarean section	3	1	One death in a case with obstructed labour due to stone in the bladder
Caesarean hysterectomy	1	1	With ruptured uterus
Ovariotomy	2	—	
Hysterectomy	2	—	
Vaginal hysterectomy	1	—	
Gilliam's and other sling operations for retroverted uterus	5	1	One death at termination of operation, post-mortem examination revealing "status lymphaticus"
Radical cure of inguinal hernia	30	—	
Operations for strangulated inguinal hernia	4	1	
Operations for strangulated femoral hernia	1	—	
Operations for umbilical hernia	1	—	
Operations for strangulated paraduodenal hernia	1	—	
Drainage operation in suppurating hernial sac.	1	—	

(*b*) *Perineal*—

	Total.	Deaths.	Remarks.
Operations for fistula-in-ano	14	—	
Operations for haemorrhoids	16	—	
Operation for imperforate anus	3	2	
Excision of post-anal tumour	1	—	
External Urethrotomy	1	—	For impacted stone in membranous portion
Excision of condylomata	3	—	

(*c*) *Genito-Urinary*—

	Total.	Deaths.	Remarks.
Suprapubic lithotomy	6	1	Death from anuria after removal of stone weighing 12 ounces
Suprapubic cystostomy	3	—	
Amputation of penis:			
Partial	1	—	
Complete	1	—	
Radical cure of hydrocele	12	—	
Orchidectomy	2	—	
Plastic operation for elephantiasis of penis	1	—	

	Total.	Deaths.	Remarks.
(*d*) *Gynaecological*—			
Dilatation and curettage	10	1	Death after evacuation of uterus, vesicular mole
Anterior colporraphy	1	—	
Excision of new growth of Bartholin's gland	1	—	
Incision of imperforate hymen	1	—	With large haematometra
(*e*) *Head and Neck*—			
Operations for depressed fracture of skull	2	—	
Schwartze operations for mastoid disease	11	—	
Drainage operations for empyema of maxillary antrum	5	—	
Excision of central portion of lower jaw	1	1	For myeloid sarcoma. Died 14 days after operation—having refused all nourishment for many days
Turbinectomy	4	—	
Plastic operations on face	2	—	
Operations for hare-lip	6	—	
Hemithyroidectomy	2	—	
Excision of adenoma of thyroid	1	—	
Tracheotomy for laryngeal diphtheria	4	1	Death on second day from pneumonia
Operation for "cut-throat"	1	—	
Ligation of both external caroted arteries	1	—	
Excision of glands in neck	3	—	
Excision of tumours and cysts of face, mouth and neck	6	—	
Enucleation of tonsils	17	—	
Excision of rodent ulcer of eyelid	1	—	
(*f*) *Operation on Thorax*—			
Excision of breast (etc.) for carcinoma	2	—	
Resection of rib and drainage for empyema	2	—	
Resection of rib for tuberculous osteitis	1	—	
Excision of malignant tumour of back	1	—	
(*g*) *Limbs*—			
Amputations:			
Arm	2	—	
Hand	1	—	
Fingers	4	—	
Thigh	3	—	
Leg	3	1	One death followed amputation for gas gangrene
Syme's	3	—	
Toes	7	—	
Plating of femur	4	—	
Plating of tibia	2	—	
Plating of ulna	3	—	
Wiring patella	3	—	

GENERAL HOSPITAL—(*cont.*)

	Total.	Deaths.	Remarks.
(*g*) *Limbs*—(cont.)			
Open replacement of fragments in compound fractures	2	—	
Open operations on long bones for mal-union, etc.	2	—	
Osteotomy	5	—	
Operations for Osteo-myelitis	10	—	
Sequestrectomy	10	—	
Excision of osteoma	1	—	
Arthrotomy	1	—	For septic arthritis
Excision of knee	1	—	
Extraction of foreign bodies	6	—	
Excision of tumours	8	—	
Subperiosteal resection of ulna for endosteal new growth	1	—	
Ligature operation for varicose veins	1	—	

III.—AT THE DISTRICT HOSPITAL, KUALA LUMPUR.

	Total.	Deaths.	Remarks.
(*a*) *Abdominal*—			
Multiple stab wounds	2	—	
Drainage operation for peritonitis	2	—	Of unknown origin
Splenectomy	2	—	
Nephrectomy	1	1	
Cholecystostomy	1	—	Acute cholecystitis
Exploratory laparatomy	1	—	
Operations for strangulated inguinal hernia	1	—	
Radical cure for inguinal hernia	5	—	
(*b*) *Genito-Urinary*—			
Radical cure for vaginal hydrocele	4	—	
Suprapubic cystotomy	1	1	
Orchidectomy	1	—	
Excision of glands of groin	1	1	For epithelioma of penis
(*c*) *Head and Neck*—			
Operations for depressed fracture of skull	3	—	
Schwartze's operation for mastoid disease	1	1	
Drainage operation for acute retro-pharyngeal abscess	1	1	Death due to acute mediastinitis
(*d*) *Thorax*—			
Resection of rib and drainage for empyema	1	—	
(*e*) *Limbs*—			
Amputations:			
Arm	1	—	
Forearm	1	—	
Leg	1	—	
Osteotomy	1	—	Compound comminuted fracture of tibia
Drainage operation for abscess of right hip with dislocation	1	—	

R. M. DANNATT,
Chief Surgeon, Selangor.

Appendix F.

ANNUAL REPORT OF THE CHIEF SURGEON, NEGRI SEMBILAN, FOR THE YEAR 1928.

Dr. C. B. Pasley was in charge of the surgical work of the State until the beginning of May, when he retired from Government service.

The following figures show the number of major operations performed in Seremban during the past three years:

1926	87
1927	180
1928	210

The number of major operations increased from 82 in the first half of the year to 128 in the second half.

The total number of minor operations performed during 1928 was 662.

The increased work at the European Hospital is shown as follows:

	1926.	1927.	1928.
Major	5	8	21
Minor	7	9	26
Total	12	17	47

The total number of deaths following major operations was as follows:

European Hospital	Nil
General Hospital	24

During the year there has been only one unavoidable anaesthetic death due to "status lymphaticus".

The scialytic lamp which has been installed is a great improvement on the old lighting system.

The X-ray work, which has been carried out by Dr. C. F. Ashby, has increased enormously, from 107 examinations in 1927 to 600 in 1928. There has been an average of 70 examinations per month since the beginning of September.

It is to be hoped that the work of constructing a new operation and radiological block will be started early next year. This is very necessary as the present accommodation is quite inadequate.

SYNOPSIS OF MAJOR OPERATIONS DURING 1928.

I.—At the European Hospital.

	Total.	Deaths.	Remarks.
(a) *Abdominal*—			
Appendicectomy	4	—	
Appendicectomy with drainage	1	—	
Inguinal hernia	1	—	Radical cure
(b) *Perineal*—			
Operation for anal fissure and fistula	3	—	
Ligature operation for haemorrhoids	1	—	
Operation for ischio rectal abscess	3	—	One for ischio rectal sinus

	Total.	Deaths.	Remarks.
(c) *Limbs*—			
Operation for removal of foreign body in forearm	1	—	
Operation for extensive cellulitis of leg	1	—	
Open manipulation and adjustment of fractured humerus and suture of severed musculo-spiral nerve	1	—	
(d) *Head and Neck*—			
Schwartze's operation for mastoid disease	1	—	
(e) *Various*—			
Tonsils and adenoids	2	—	
Excision of sebaceous cyst of buttock	1	—	
Dilatation and curettage	1	—	

II.—AT THE GENERAL HOSPITAL.

(a) *Abdominal*—			
Posterior gastro-jejunostomy for chronic gastric ulcer	3	—	
Posterior gastro-jejunostomy and suture of perforated gastric ulcer	1	—	
Posterior gastro-jejunostomy for chronic duodenal ulcer	3	—	
Anterior gastro-jejunostomy for chronic gastric ulcer	1	—	
Radical cure for inguinal hernia	13	—	
Operation for strangulated inguinal hernia	4	1	Late case accompanied by gangrene of the bowel
Caecostomy for intestinal obstruction	1	1	Late case
Appendicectomy	6	—	
Appendicectomy with drainage	6	1	Late case with general peritonitis
Drainage operation for general peritonitis	4	—	
Drainage operation for localised abscess of appendicular origin	4	—	
Operation for perforated gastric ulcer—suture and drainage	2	2	Late cases with general peritonitis
Operation for gun-shot wound of abdomen	1	1	With multiple perforating wounds of intestine
Mayo's operation for umbilical hernia	1	—	
Cholecystostomy	1	—	
Excision of fibroma of flank	1	—	
Operation for stab wounds of the abdomen	5	3	Two cases complicated by penetrating wounds of the chest Suture of perforated stomach in one case
Operation for intestinal obstruction by bands	1	1	Peritonitis

	Total.	Deaths.	Remarks.
(*a*) *Abdominal*—(cont.)			
Exploratory laparotomy	4	—	
Drainage operation for pelvic abscess	2	—	
Colostomy for intestinal obstruction	1	1	
Trans-pleural drainage of sub-phrenic abscess	1	—	
Excision of sinus of abdominal wall	1	—	
Operation for perforated duodenal ulcer—suture and drainage	1	1	General peritonitis
Open drainage of liver abscess	1	—	
Drainage operation for acute haemorrhagic pancreatitis	1	—	
Operation for abscess of abdominal wall	1	—	
Splenectomy	3	1	For rupture
Operation for radical cure of ventral hernia	1	—	
Operation for drainage of psoas abscess	1	—	
(*b*) *Ano-Rectal*—			
Operation for haemorrhoids	8	—	
Operation for anal fissure	4	—	
Radical cure for fistula in ano	6	—	
Operation for rectal prolapse	2	—	
Ischio rectal abscess	2	—	
(*c*) *Thorax*—			
Excision of carcinoma of breast	1	—	
Excision of fibroma of back	1	—	
Drainage operation for empyema	2	1	
Excision of fibro-adenoma of breast	1	—	
(*d*) *Genito-Urinary*—			
External urethrotomy for stricture	1	—	
External urethrotomy for calculus	2	—	
Operation for suppurating hydrocele	1	—	
Radical cure for vaginal hydrocele	6	—	
Supra-pubic cystotomy	1	—	
Supra-pubic lithotomy	1	1	Late case with advanced urinary infection
Operation for urethral stricture and perineal sinus	1	—	
Hydrocele of the cord	1	—	
Partial amputation of the penis with bloc dissection of inguinal glands	1	1	
Supra-pubic cystotomy and excision of vesical papilloma	1	—	
Orchidectomy	1	—	Degenerated cyst of testicle

	Total.	Deaths.	Remarks.
(*e*) *Gynaecological—*			
Incomplete colpo-perinaeorrhaphy	2	—	
Complete colpo-perinaeorrhaphy	1	—	
Sub-total hysterectomy	2	—	Multiple fibroids
Dilatation and curettage	2	—	
Induction of labour	1	—	For insanity of pregnancy
Posterior colpotomy and drainage of pelvic abscess	1	—	
Ventral suspension of uterus	1	—	
Drainage operation for pyosalpinx	1	—	
Excision of par-ovarian cyst	2	—	
Salpingo-oophorectomy	1	—	Prolapsed cystic ovary and ectopic gestation
Caesarean section	1	—	For vaginal atresia
(*f*) *Head and Neck—*			
Excision of ranula	1	—	
Laryngotomy	1	—	
Rose's operation for hare lip	4	1	"Status lymphaticus"
Excision of superior maxilla for sarcoma	1	—	With preliminary laryngotomy and ligature of external carotid artery
Tracheotomy and repair of "cut throat"	1	—	
Tonsils and adenoids	1	—	
Operation for tumour of upper eyelid	1	—	
Trephine for drainage of cerebral abscess	1	—	
Operation for removal of foreign body in root of neck	1	—	
Tracheotomy and repair of completely severed oesophagus	1	1	
Cystadenoma of thyroid gland	1	—	Excision
Operation for caries of mandible	1	—	
Enucleation of eyeball	1	—	
Excision of sarcoma of scalp	1	—	
Schwartze's operation for mastoid disease	5	—	
Tracheotomy	1	—	Palliative for inoperable malignant disease of larynx
Decompression operation for fracture of skull	4	2	Two cases complicated by fracture of the base
Ligature of external carotid artery	1	—	
(*g*) *Limbs—*			
Disarticulation through knee-joint	1	1	
Sequestrectomy	1	—	Osteo-myelitis of tibia
Operation for repair of crushed fingers and multiple fractures	1	—	

	Total.	Deaths.	Remarks.
(*g*) *Limbs*—(cont.)			
Repair of severed tendons and muscles of wrist	1	—	
Operation for septic arthritis of knee-joint	1	—	
Plating of fractured femur	1	—	For non-union and malposition
Excision of sarcoma of thigh	1	—	
Operation for extensive cellulitis of lower limb	2	—	
Wiring of fractured patella	1	—	
Operation for septic arthritis with fractured patella	1	1	Septicaemia
Open adjustment of fragments in fracture of the radius	1	—	
Peri-arterial sympathectomy	1	—	Femoral
Diaphysectomy	1	—	Osteo-myelitis of tibia
Insertion of intra-medullary bone peg for un-united fracture of tibia	1	—	
Operation for necrosis of oscalcis	1	—	
Operation for extensive incised wounds of lips and face	1	—	
Suture of severed tendons of wrist with primary suture of ulnar nerve	1	—	
Amputation:			
Leg	4	2	Late cases accompanied by gangrene
Arm	4	—	

C. S. WILSON,
Acting Chief Surgeon, Negri Sembilan.

19th January, 1929.

Appendix G.

ANNUAL REPORT OF THE MEDICAL SUPERINTENDENT, CENTRAL MENTAL HOSPITAL, TANJONG RAMBUTAN.

Sir,—I have the honour to forward herewith the eighteenth annual report of the Central Mental Hospital, that for the year 1928:

	Males.	Females.	Males.	Females.
Federated Malay States.—				
2. Remained on 31st December, 1927	1,316	386		
Admitted during 1928	614	181		
Discharged—Recovered	265	63		
Relieved	57	26		
Not improved	38	10		
Not insane	2	1		
Absconded	28	2		
Died	122	21		
Remaining on 31st December, 1928	—	—	1,418	444
Singapore.—				
Remained on 31st December, 1927	105	94		
Admitted during 1928	—	—		
Transferred ,,	96	93		
Absconded ,,	1	—		
Died ,,	8	1		
Remaining on 31st December, 1928	—	—	—	—
Criminals.—				
Remaining on 31st December, 1927	115	1		
Admitted during 1928	36	1		
Discharged ,,	17	1		
Died ,,	5	—		
Remaining on 31st December, 1928	—	—	129	1
Kedah.—				
Remained on 31st December, 1927	142	35		
Admitted during 1928	49	13		
Discharged ,,	25	8		
Died ,,	13	2		
Absconded ,,	2	1		
Remaining on 31st December, 1928	—	—	151	37
Perlis.—				
Remained on 31st December, 1927	13	4		
Admitted during 1928	—	1		
Died ,,	1	—		
Remaining on 31st December, 1928	—	—	12	5
Kelantan.—				
Remained on 31st December, 1927	8	1		
Admitted during 1928	5	3		
Discharged ,,	1	—		
Died ,,	1	—		
Remaining on 31st December, 1928	—	—	11	3
Total remaining on 31st December, 1928	—	—	1,721	490
Percentage of recoveries		41.84		
,, deaths on total treated		5.56		
,, ,, daily average		7.53		

3. The total of 2,211 shows a decrease of nine.

4. This decrease is not, however, as satisfactory as it seems as it is due to the removal of 189 Singapore patients, who are now accommodated in the New Singapore Mental Hospital at Trafalgar, Singapore.

5. The figure, making allowance for these transfers, is actually an increase of 180, which increase is 13 less than 1927 when the figure was 193, but more than the 1926 increase of 126.

6. The Federated Malay States patients increased by 160 against 152 last year, which was until now the highest increase we had had.

7. Kedah patients increased by 11, which is the smallest increase Kedah has shown for the last five years.

8. The Perlis numbers show no change. Kelantan shows an increase of 5, but this would have been greater had we not had to refuse admissions from Kelantan owing to want of accommodation.

9. Totalling these separate increases, we get a total increase of 190 against the actual increase of 180, but this discrepancy in due to the fact that the Singapore decrease is not actually 189 but 199, as in paragraph 4 I only noted 189 Singapore patients transferred; there were nine deaths and one absconding amongst the Singapore patients before they were transferred, so that the actual decrease in Singapore patients was 199.

10. *Admissions.*—We admitted 903 patients during the year, which is three more than what I described as an extraordinary total of 900 last year, and 735 in 1926.

11. I cannot, beyond what I wrote last year, account for the large increase in admissions during the last few years, though three over last year is not so bad. Still when we think the admissions are 168 more than in 1926, one begins to wonder where it will end.

12. The Federated Malay States admissions number 795 against 773 and 666 in 1927 and 1926 respectively. Our only satisfaction is that whereas the 1927 increase in admission was 107 over 1926, the 1928 increase over 1927 in only 22.

13. This year, in the majority of the tables, I have included Kedah and Perlis patients with Federated Malay States, as they come in under exactly the same conditions.

14. The Kelantan patients I have not included, as they are principally chronics before they arrive. The criminals, of course, are treated under a different head.

15. The months which provided us with the greatest number of patients were:
May, 90; January, 87; and October, 82.

16. Last year it was January, and November first and second, with March and May bracketed third. In 1926 October and January showed the greatest number of admissions.

17. It will be noticed that January has been one of the most prolific months year after year.

18. Kuala Lumpur, Ipoh and Taiping as usual provided us with the largest number of cases; Kuala Lumpur, as one would expect, being an easy first, beating Ipoh by over 40, as well as being the only town to top the century.

19. Primary dementia again heads the list of diseases on admission, with recent melancholia second, confusional insanity third, recent mania fourth, and general paralysis of the insane fifth.

20. Primary dementia not alone holds the first place, but shows an alarming increase over last year. I have many times pointed out the seriousness of this, as primary dementia is a disease mainly of the young, and the chance of permanent recovery is very slight.

21. Recent melancholia, though second, shows a reduction in numbers; while recent mania has fallen to fourth place. Confusional insanity not only shows an increased number of cases, but has risen to third place instead of fourth.

22. General paralysis of the insane is still fifth, but shows a considerable increase over last year, though not even now as high as in 1926.

23. *Discharges.*—The discharges number 495. This only includes Federated Malay States, Kedah and Perlis, with which all the following tables deal. I have not included Kelantan criminals and the Singapore patients, who were transferred and not discharged.

24. Last year the discharges were 414, and in 1926 two hundred and seventy-six. Of these, 83 were discharged relieved, several of whom afterwards recovered, and would have been added to our list of recoveries had they remained a little longer.

25. Of the 52 "Not Improved", the vast majority were removed to their country, and were Chinese or Indians. Two were discharged as not insane.

26. *Recoveries.*—The balance, 358, were discharged recovered, against 292 last year, and 207 in 1926.

27. The recovery rate works out at 41.84, the highest we have ever had for many years. Last year the recovery rate was 37.77, and 32.17 in 1926.

28. I only hope this improvement is due to better care and treatment, and to friends sending patients earlier for treatment instead of waiting till the last minute when driven to it as they used to do, and not merely to the usual fluctuation one sees in all diseases.

29. I am not going to make extravagant claims merely to have to make excuses in some future years; but seeing that improvement in the recovery rate has been steady, I hope we can take at least some of the credit to ourselves.

30. Of the forms of mental diseases amongst the recoveries we find primary dementia first, recent melancholia second, confusional insanity third and recent mania fourth.

31. It may be said,

> "Oh yes, this shows how he has had such a high recovery rate, he includes primary dementia amongst the recoveries."

32. Very good, but what is one to do when a patient makes a perfectly good recovery—one may know that the probability is that he or she will come back at a later date, but can hardly do other than discharge him.

33. If, however, we take the proportion of recoveries in those four types, we find that primary dementia is fourth instead of first.

34. This again makes one deplore the number of cases of primary dementia amongst the admissions, as not alone does it strike down its victim before he has reached his prime, but shows a small proportion of recoveries; and even those recoveries are probably not permanent.

35. *Aetiology.*—The five causes which we have been accustomed to find at the top of the list are still there, but the order has changed. The order this year is syphilis, which has risen from third place, gastro-intestinal system, cardio-vascular degeneration, alcohol and haemopoietic system. Last year the order was haemopoietic system, gastro-intestinal system, syphilis and alcohol.

36. Syphilis and alcohol have each gone up: syphilis two places and alcohol one.

37. The rise in syphilis is due, to a certain extent, to more careful examination and a greater use being made of the Government laboratory; but the rise of alcohol is just the more or less steady rise it has maintained for some years.

38. The alcohol question is becoming serious, and it will be seen that alcohol is noted as the cause in 21 females.

39. This I think will bring home how serious a menace alcohol is becoming to the health of the country.

40. Against this I would point to three cases of drugs, none of them opium but all hashish.

41. *Deaths.*—The total number of deaths was 174, against 173 last year and 132 in 1926.

42. The death-rate works out at 5.56 per cent. on total treated, and 7.53 per cent. on daily average, against 5.95 per cent. and 8.19 per cent., respectively, last year.

43. The chief causes of death were dysentery, 31; general paralysis of the insane, 27; and pulmonary tuberculosis 23.

44. Dysentery shows three more victims than last year: pulmonary tuberculosis, three less; and general paralysis of the insane, 12 less; a remarkable reduction, which is due, in part, to the reduced general paralysis of the insane admission in 1927.

45. The number of deaths from pulmonary tuberculosis is remarkably small seeing how prone the Mental Hospital case is to phthisis.

46. *Suicides.*—Unfortunately there was one suicide. A female patient hanged herself on the night of 1st August, 1928. This was due to carelessness on the part of the attendant in charge, who was dismissed. Even though this case was due to carelessness I often marvel we have not a number of suicides nightly, as the wards are very badly lighted.

47. There were admitted 67 suicidal cases during the year.

48. *Fatalities.*—There were six fatalities during the year against three last year. Three were due to fracture of the skull due to falls on the cement floor of the ward, and the other three due to ruptured spleens caused by blows or pushes from other patients.

49. *Abscondings.*—Thirty-four patients absconded during the year, which is a great reduction on last year when there were sixty-nine.

50. This was to great extent due to the fact that attendants found it did not pay to allow patients to abscond through carelessness.

51. There was no reduction in the amount of freedom allowed to patients, and we had more patients than ever accommodated in farms.

52. *Criminals.*—There were 37 criminals admitted during the year against 45 last year and 38 in 1926.

53. Of these, 18 were discharged and five died, leaving 130 at the end of the year.

54. There is a steady increase in this class of case, and in time to come it will be necessary to consider the advisability of building a criminal hospital like Broadmore.

55. This is more especially so when one considers the time which has to be devoted to these cases, and how frequently one is called away to give evidence at assizes—a thing which the Medical Superintendent of a County or Borough Mental Hospital at home is not expected to do.

56. This year I was not called away so much, and had not to visit either Kuantan or Alor Star, but Kuala Lumpur, Ipoh and Seremban provided cases for me.

57. *New buildings.*—The first class wards were finished on 1st May, 1928, and occupied the same day.

58. The new store and the extension to offices were also completed and have proved a blessing to everyone concerned.

59. The male wards, Nos. 28 and 29, to accommodate 60 patients each, were almost completed. These wards are the last of the male wards of the scheme agreed upon in 1913.

60. *Farms.*—We, with patient labour, built three new farms in 1928. The farms, including wood-cutters' house, provided produce to the value of $72,570.37 against $60,536.70 last year. The vegetable farms produced 360,068 katies of vegetables.

61. Those who are not so keenly interested in the health giving exercise and employment provided for the patients by farms, can appreciate them from the saving they are to Government; but we, whose work is in the hospital, look on the farms not as revenue producing affairs but as a valuable means of treatment.

62. Again, were it not for the farms and the 400 patients they accommodate, we would have to refuse patients, as we would have no room for them in our wards, which are after all inelastic.

63. The farms were without anyone to supervise them; as when the new clerk, who was to relieve Mr. Saravanamuthu, the Steward, so as to allow him to resume his out-door work, arrived, Mr. Saravanamuthu became ill and eventually had to go to Ceylon on leave.

64. I hope to have Mr. Saravanamuthu back in two months, when the farms will be again supervised. When I say supervised, I mean as regards the produce, not as regards the patients.

65. *Anti-malarial work.*—Three thousand five hundred and sixty-six feet of concrete inverts were laid, as against 2,600 feet in 1927, and 1,430 in 1926. Of these, 1,200 were laid in the Sungei Bulat as against 888 feet in 1927.

66. If we can carry on at this rate, or somewhere approaching it, we should have the main stream and several of its tributaries finished in another two years, and the rest will be well on the way to completion.

67. This should reduce the anti-malarial cost to almost vanishing point, if inspection is properly carried out, and repairs done immediately they are needed.

68. The malarial incidence was .14 on cases and .13 on individuals, against .53 and .48, respectively, in 1927 and 1.9 and 1.8 in 1926.

69. We still find new breeding grounds occasionally, usually outside the reserve, and they are dealt with by the Mosquito Destruction Board's Overseer with his oiling coolies.

70. *Staff.*—The following changes took place amongst the staff in 1928:

Dr. Fred Wilson, Assistant Medical Superintendent, proceeded on seven months and 29 days' full-pay leave from 6th September, 1928, and was retired on Medical grounds on 6th December, 1928.

Dr. J. W. Murdoch, Second Assistant Medical Superintendent, appointed on 12th January, 1928, arrived on 9th February, 1928.

Dr. E. G. Morris, Medical Officer, appointed on 10th August, 1928, arrived on 6th September, 1928, and acted for Second Assistant Medical Superintendent.

Dr. S. B. Pal, Senior Assistant Physician, promoted to Specialist Rank from 1st January, 1928.

Dr. S. B. Pal, Senior Assistant Physician, proceeded on 42 days' vacation leave and 5 months and 5 days' half-pay leave from 13th September, 1928.

Dr. S. R. Savoor, Assistant Surgeon, appointed on 3rd August, 1928, transferred to Central Mental Hospital on 12th August, 1928.

Mrs. H. M. Josephs, Matron, proceeded on 42 days' vacation leave and three months' commuted full-pay leave from 15th December, 1927, to 25th April, 1928.

Mrs. J. R. G. Young, European Nurse, acted for Matron from 15th December, 1927, to 25th April, 1928.

Mrs. J. R. G. Young, European Nurse, transferred to District Hospital, Taiping, on return of Matron on 26th April, 1928, and returned from Taiping on 18th September, 1928.

Miss F. L. Webb, European Nurse, transferred from Batu Gajah where she had been since her arrival in the country on 28th January, 1927.

Mr. A. P. Chandler, European Nurse (male), appointed on 10th August, 1928, arrived in the State on 6th September, 1928.

Miss M. T. Lamb, European Nurse, appointed on 14th September, 1928, arrived in the State on 11th October, 1928.

Miss A. O'Sullivan European Nurse, appointed on 14th September, 1928, arrived in the State on 11th October, 1928.

Mr. S. Saravanamuthu, Steward, proceeded on 42 days' vacation leave and two months' half-pay leave from 29th September, 1928.

Mr. John de Silva, Storekeeper, transferred to Batu Gajah Hospital on 18th December, 1928.

Mr. Kalleymuthu, Storekeeper, transferred from Batu Gajah Hospital on 18th December, 1928.

Mr. P. T. Nagaretnam, Dresser, Grade II, promoted to Hospital Assistant, with effect from 1st July, 1927, inclusive.

Messrs. S. V. Suppiah and C. Mylvaganam, Dressers, Grade III, passed the Final Examination of the Royal Medico-Psychological Association of Great Britain and Ireland on 18th May, 1928.

Miss Tan Guat Beng, Probationer Nurse, sat for the Final Examination of the Royal Medico-Psychological Association of Great Britain and Ireland on 12th November, 1928, but the result is not yet known.

Mr. Deleap Singh, Probationer Dresser, appointed on 1st November, 1928.

Mr. A. Sreetharam, Temporary Clerk, transferred from Anderson School, Ipoh, on 15th October, 1928.

Chung Yoon, Assistant Head Attendant, retired on 24th May, 1928.

Sahadeo, Assistant Head Attendant, retired on 12th November, 1928.

B. Palakdari, Charge Attendant, appointed Assistant Head Attendant from 24th May, 1928.

Syed Jabar Shah, Watchman, services were dispensed with from 9th July, 1928.

Alla Datta, Watchman, proceeded on 42 days' vacation leave and three months and six days' no-pay leave from 1st March, 1928, but did not resume duty until 16th September, 1928.

Haji Muhammad, Watchman, appointed on 7th August, 1928, and dismissed on 31st December, 1928.

Muhammad Noor, Punkah-puller, services were dispensed with from 1st October, 1928.

Sanwas Khan, Watchman, appointed 7th August, 1928, and resigned on 31st December, 1928.

Haji Mahmud, Punkah-puller, appointed on 1st October, 1928.

71. *Attendants.*—We still suffer from a shortage of attendants. The class we are getting is also extremely poor.

72. *First Class Wards.*—These wards which were commenced in July, 1925, were completed and handed over in May. We have so far admitted nine males and two females, and discharged five males, so that four males and two females remained at the end of the year. One male patient made a complete recovery and has gone home. Two others who were extremely ill on admission are now steadily improving.

73. One, whom I have already mentioned, was removed by his relatives, I believe owing to the difficulty of catering for Europeans and Asiatics in the same kitchen. One patient was discharged "Not Insane."

74. *Maintenance.*—The maintenance rate works out at $194.81 per head per annum against $193.72 last year and $176.23 in 1926. Now, of course, with the First Class Wards open the maintenance rate will be higher than formerly, but I hope it will not rise any further.

75. *Revenue.*—We collected in fees from Singapore, Kedah, Perlis and Kelantan, as well as our own Federated Malay States paying patients, $151,584.44.

76. We shall have to be prepared for a considerable drop in this figure next year, as the Singapore patients have now all left.

77. It may not be out of place to mention here that the patients' work, including farms, workshops, drainage, buildings, etc., was valued at $110,260.90, a figure which shows what Government is saved by the industry of the patients.

78. *Electric Light.*—Although there was a vote of $100,000 in the 1928 Estimates for Installation of Electric Light, nothing has been done, and the matter is again to be considered by the Electrical Board early in 1929.

79. *Amusements.*—The usual in-door and out-door games were indulged in.

80. The Cricket XI had a very successful year, and hockey has now been established as one of our regular games.

81. Football has not so far been organised to the same extent as cricket, but we hope to have a full fixture list in 1929.

82. The Annual Athletic Sports were again a success, and were appreciated by all who took part in them.

83. Fewer cinemas visited the town so the patients suffered from this; but we had a visit from an excellent conjuror, whose performance was, however, rather interfered with owing to the bad lighting of the dining hall, where he gave his performance.

84. The time has now come when we should have a cinema of our own as the majority of Home Mental Hospitals have.

I have the honour to be,
Sir,
Your obedient servant,
W. F. SAMUELS,
Medical Superintendent,
Central Mental Hospital, Tanjong Rambutan.

Central Mental Hospital,
Tanjong Rambutan, *30th January, 1929.*

TABLE A.

GENERAL TABLE SHOWING THE MOVEMENT OF THE HOSPITAL POPULATION DURING THE YEAR 1928.

	Certified patients.					
	M.	F.	Total.	M.	F.	Total.
On the hospital register, January 1st, 1928 ...	1,699	521	2,220			
Total cases admitted during the year	704	199	903			
Total cases under treatment during the year ...	2,403	720	3,123			
Cases discharged or transferred during the year—						
Recovered	...	...	...	289	72	361
Relieved	...	...	...	67	26	93
Not improved	...	...	...	145	104	249
Not insane	...	...	...	...	1	1
Died during the year	...	...	...	150	24	174
Absconded	...	...	...	31	3	34
Total cases discharged, transferred and died during the year...	682	230	912	682	230	912
On hospital register on December 31st, 1928 ...	1,721	490	2,211			
Average daily number on the registers during the year 1928	...	...	...	2,309		

TABLE B.

SHOWING THE FORM OF MENTAL DISORDER ON ADMISSION IN THE DIRECT ADMISSIONS DURING THE YEAR 1928.

Forms of mental disorder.		Direct admission.		
		M.	F.	Total.
Congenital or infantile mental deficiency (idiocy or imbecility) occurring as early in life as it can be observed.	1. Intellectual—			
	(*a*) With epilepsy	4	4	8
	(*b*) Without epilepsy	11	5	16
	2. Moral			
Insanity occurring later in life.	1. Insanity with epilepsy	10	4	14
	2. General paralysis of the insane ...	36	7	43
	3. Insanity with grosser brain lesions ...	1	...	1
	4. Acute delirium	2	...	2
	5. Confusional insanity	112	10	122
	6. Stupor	3	3	6
	7. Primary dementia	297	48	345
	8. Mania—			
	(*a*) Recent	28	21	49
	(*b*) Chronic ...	...	3	3
	(*c*) Recurrent	1	1	2
	9. Melancholia—			
	(*a*) Recent	74	61	135
	(*b*) Chronic	...	7	7
	(*c*) Recurrent	3	4	7
	10. Alternating insanity	9	3	12
	11. Delusional insanity—			
	(*a*) Systematised	5	...	5
	(*b*) Non-systematised	2	...	2
	12. Volutional insanity—			
	(*a*) Impulse			
	(*b*) Obsession			
	(*c*) Doubt			
	13. Moral insanity			
	14. Dementia—			
	(*a*) Senile	62	12	74
	(*b*) Secondary	1	1	2
	15. Not Insane	2	1	3
	Total ...	663	195	858

PATIENTS DISCHARGED AS CURED DURING THE YEAR 1928.

	Form of mental disorder.	M.	F.	Total.
Congenital or infantile mental deficiency (idiocy or imbecility) as occurring as early in life as it can be observed.	1. Intellectual—			
	(*a*) With epilepsy			
	(*b*) Without epilepsy			
	2. Moral			
Insanity occurring later in life.	1. Insanity with epilepsy	3	2	5
	2. General paralysis of the insane			
	3. Insanity with grosser brain lesions			
	4. Acute delirium			
	5. Confusional insanity	58	5	63
	6. Stupor			
	7. Primary dementia	102	20	122
	8. Mania—			
	(*a*) Recent	41	15	56
	(*b*) Chronic			
	(*c*) Recurrent	6	4	10
	9. Melancholia—			
	(*a*) Recent	51	20	71
	(*b*) Chronic			
	(*c*) Recurrent	7	2	9
	10. Alternating insanity	9	...	9
	11. Delusional insanity—			
	(*a*) Systematised			
	(*b*) Non-systematised	10	1	11
	12. Volitional insanity—			
	(*a*) Impulse			
	(*b*) Obsession			
	(*c*) Doubt			
	13. Moral insanity			
	14. Dementia—			
	(*a*) Senile			
	(*b*) Secondary			
	15. Not insane	...	2	2
	Total ...	288	70	358

AN ANALYSIS OF THE DISCHARGES AND TRANSFERS DURING THE YEAR 1928.

	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.
Discharges as recovered—									
From direct admissions									
First attack cases	107	42	149						
Not first attack cases	84	21	105						
Cases unknown whether first attack or not	107	7	114						
Total from direct admissions ...	...	...	...	298	70	368			
				Relieved.			Not improved.		
Discharged (not recovered) as—									
Relieved	61	27	88	61	27	88			
Not improved	40	11	51	...	...	...	40	11	51
Total ...	101	38	139						
Transferred as—									
Relieved	1	...	1	1	...	1			
Not improved	96	93	189	...	...	...	96	93	189
Total ...	97	93	190						
Destination of such transfers—									
To Leper Asylum	1	...	1						
To Mental Hospital, Singapore... ...	96	93	189						
Total ...	97	93	190						
Total discharged and transferred as—									
Relieved	...	...	...	62	27	89			
Not improved	...	...	...	...	...	...	136	104	240

TABLE SHOWING THE FORM OF MENTAL DISORDERS ON 31ST DECEMBER, 1928, OF THOSE ON THE REGISTER ON THAT DATE.

Forms of mental disorders.		M.	F.	Total.
Congenital or infantile mental deficiency (idiocy) or imbecility occurring as early in life as it can be observed.	1. Intellectual—			
	(*a*) With epilepsy	5	9	14
	(*b*) Without epilepsy	50	14	64
	2. Moral			
Insanity occurring later in life.	1. Insanity with epilepsy	51	21	72
	2. General paralysis of insane	45	5	50
	3. Insanity with grosser brain lesion ...	7	3	10
	4. Acute delirium			
	5. Confusional insanity	67	19	86
	6. Stupor	5	4	9
	7. Primary dementia	359	67	426
	8. Mania—			
	(*a*) Recent	24	3	27
	(*b*) Recurrent	14	12	26
	(*c*) Chronic	43	22	65
	9. Melancholia—			
	(*a*) Recent	65	12	77
	(*b*) Recurrent	21	34	55
	(*c*) Chronic	91	42	133
	10. Alternating insanity	28	6	34
	11. Delusional insanity—			
	(*a*) Systematised	29	1	30
	(*b*) Non-systematised	37	4	41
	12. Volitional insanity—			
	(*a*) Impulse	4	...	4
	(*b*) Obsession			
	(*c*) Doubt	1	...	1
	13. Moral insanity			
	14. Dementia—			
	(*a*) Senile	112	24	136
	(*b*) Secondary	663	188	851
	15. Not insane			
	Total ...	1,721	490	2,211

Favourable 271
Doubtful 110
Unfavourable 1,830

SPECIFIC DISEASES WHICH CAUSED DEATH DURING 1928.

Dysentery	31
Pneumonia	11
Phthisis	23
Cardio vascular degeneration	14
General paralysis of the insane	28
Rupture of spleen	4
Haemorrhage due to fracture of the pelvis	1
Acute osteo myelitis	1
Fatty degeneration of heart	4
Haemorrhage in the basal nuclei	1
Epilepsy	1
Cerebral haemorrhage	1
Diarrhoea	1
Beri-beri	1
Gumma of the liver	1
Carcinoma ventriculi	1
Suppurative meningitis	1
Chronic colitis	1
Acute enteritis	1
General debility	1
Syphilitic arteritis	1
Fracture of skull	2
Exhaustion from acute mania	2
Status epilepticus	5
Myocardial degeneration	16
Asthma	2
Leprosy	3
Gangrene of left lung	1
Septicaemia	1
Malaria	3
Strangulation by hanging	2
Influenza	1
Heart failure	1
Nephritis	1
Exhaustion from maluntrition	1
Total	174

TABLE SHOWING THE FORM OF MENTAL DISORDER AND NATIONALITY ON ADMISSION IN THE DIRECT ADMISSIONS DURING THE YEAR 1928.

Forms of mental disorders.		Males.							Females.							Total.		
		Europeans.	Chinese.	Malays.	Tamils.	Javanese.	Eurasians.	Others.	Europeans.	Chinese.	Malays.	Tamils.	Javanese.	Eurasians.	Others.	Males.	Females.	Total.
Congenital or infantile mental deficiency (idiocy or imbecility) occurring as early in life as it can be observed.	1. Intellectual—																	
	(a) With epilepsy ...	...	3	...	1	...	...	...	...	4	...	...	...	...	...	4	4	8
	(b) Without epilepsy... ...	...	8	...	3	...	...	...	...	5	...	...	...	...	...	11	5	16
	2. Moral																	
Insanity occurring later in life.	1. Insanity with epilepsy	...	3	2	5	...	...	...	...	1	1	1	1	...	...	10	4	14
	2. General paralysis of the insane	...	28	2	5	...	...	1	...	7	...	...	...	...	...	36	7	43
	3. Insanity with grosser brain lesions ...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	1
	4. Acute delirium ...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	2	...	2
	5. Confusional insanity	4	41	29	37	...	...	1	...	6	...	4	...	...	...	112	10	122
	6. Stupor	...	2	1	...	...	...	...	...	...	...	3	...	...	...	3	3	6
	7. Primary dementia ...	2	142	49	101	2	...	1	1	37	5	5	...	...	...	297	48	345
	8. Mania—																	
	(a) Recent	1	15	3	9	...	...	...	...	8	1	10	...	...	2	28	21	49
	(b) Recurrent	...	...	...	1	...	...	...	...	...	1	...	...	...	...	1	1	2
	(c) Chronic	...	...	...	...	...	...	...	...	1	...	2	...	...	...	...	3	3
	9. Melancholia—																	
	(a) Recent	...	17	15	38	1	...	3	...	23	5	33	...	...	...	74	61	135
	(b) Recurrent	...	2	...	1	...	...	...	...	1	...	3	...	...	...	3	4	7
	(c) Chronic	...	...	...	...	...	...	...	...	1	...	6	...	...	...	...	7	7
	10. Alternating insanity	...	3	1	5	...	...	...	...	1	1	1	...	...	...	9	3	12
	11. Delusional insanity—																	
	(a) Systematised ...	...	1	1	3	...	...	...	...	...	...	...	...	...	...	5	...	5
	(b) Non-systematised ...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	2	...	2
	12. Volitional insanity—																	
	(a) Impulse																	
	(b) Obsession																	
	(c) Doubt																	
	13. Moral insanity ...																	
	14. Dementia—																	
	(a) Senile	...	45	9	6	...	...	2	...	4	1	4	3	...	...	62	12	74
	(b) Secondary	...	...	1	...	...	...	...	...	...	1	...	...	...	...	1	1	2
	15. Not insane	...	...	...	2	...	...	...	...	1	...	...	...	...	...	2	1	3
	Total ...	7	312	114	219	3	...	8	1	100	16	72	4	...	2	663	195	858

ANALYSIS OF THE ADMISSIONS DURING THE YEAR 1928.

Classes of admissions.	Congenital.			Acquired.									Total.		
				First attack.			Not first attack.			Unknown whether first attack or not.					
	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.
Direct	4	2	6	263	64	327	76	20	96	320	109	429	663	195	858
Total admissions	4	2	6	263	64	327	76	20	96	320	109	429	663	195	858

AGES.

Civil year.	Less than 10 years of age.			10-14			15-19			20-24			25-29			30-34			35-39			40-44			45-49			50-54			55-59			60-64			65-69			70-74			75-79			80-84			Total.		
	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.
1928 ...	1	1	2	3	7	10	13	9	22	70	30	100	120	40	160	140	41	181	120	23	143	83	15	98	45	14	59	34	7	41	23	2	25	4	2	6	3	1	4	2	1	3	2	2	4	...	...	...	663	195	858
1927 ...	...	...	...	6	7	13	26	15	41	70	19	89	100	35	135	135	46	181	82	33	115	64	18	82	49	6	55	23	3	26	14	3	17	11	3	14	4	...	4	...	...	...	...	...	...	1	...	1	585	188	773
1926 ...	...	1	1	4	4	8	20	6	26	41	15	56	99	32	131	69	34	103	111	16	127	54	22	76	38	10	48	18	5	23	16	4	20	10	5	15	6	...	6	2	1	3	...	...	...	1	...	1	489	155	644
1925 ...	1	1	2	5	3	8	18	4	22	41	14	55	61	20	81	90	34	124	80	20	100	64	15	79	40	8	48	28	5	33	9	5	14	8	4	12	1	4	5	1	...	1	1	...	1	...	1	1	448	138	586
1924 ...	2	...	2	1	1	2	12	9	21	45	13	58	75	14	89	75	25	100	70	16	86	61	12	73	30	8	38	26	3	29	8	...	8	11	2	13	3	...	3	...	...	...	...	...	...	...	...	...	416	106	522

DISTRICTS FROM WHICH PATIENTS WERE ADMITTED DURING THE YEAR 1928.

Kuala Lumpur	139	Bidor	3
Ipoh	94	Tambun	3
Taiping	66	Jelapang	3
Seremban	44	Jelebu	3
Klang	40	Rantau	3
Batu Gajah	30	Selama	3
Kuala Kangsar	29	Sabak Bernam	3
Parit Buntar	25	Lahat	3
Teluk Anson	23	Temoh	3
Bentong	20	Gemas	2
Kampar	19	Sungei Way	2
Kajang	15	Batu Arang	2
Sungei Siput	15	Rawang	2
Tapah	15	Batu Caves	2
Kuala Kubu	14	Grik	2
Sitiawan	13	Trolak	2
Tampin	11	Pekan	2
Kuala Lipis	10	Parit	2
Gopeng	10	Batu Kurau	2
Tanjong Rambutan	10	Batu Tiga	1
Port Dickson	10	Trong	1
Raub	9	Papan	2
Kuala Pilah	8	Pulai	1
Bagan Serai	8	Gula	1
Pusing	6	Serdang	1
Malim Nawar	6	Siputeh	1
Tanjong Malim	6	Tronoh	1
Kuantan	6	Port Swettenham	1
Chemor	5	Mentakab	1
Menglembu	5	Puchong	1
Mantin	4	Kepong	1
Salak North	4	Slim River	1
Sungkai	4	Rasa	1
Kuang	1	Bikam	2
Kota Bharu	1	Sungei Rengam	1
Sungei Dua	1		
Semenyih	1	Total	795
Sungei Besi	3		

AETIOLOGICAL, SHOWING THE AETIOLOGICAL FACTORS AND ASSOCIATED CONDITIONS ASCERTAINED IN THE DIRECT ADMISSIONS DURING THE YEAR 1928, DISTINGUISHED BETWEEN CASES CONGENITAL, FIRST ATTACK, NOT FIRST ATTACK AND UNKNOWN WHETHER FIRST ATTACK OR NOT.

(1)	(2) Congenital cases.									(3) First attack cases.									(4) Not first attack cases.								
	Principal.			Contributary.						Principal.			Contributary.						Principal.			Contributary.					
Aetiological factors and associated conditions.	Instances where regarded as the essential or chief factor.			Instances where regarded as a contributary or associated condition.			Total incidence.			Instances where regarded as the essential or chief factor.			Instances where regarded as a contributary or associated condition.			Total incidence.			Instances where regarded as the essential or chief factor.			Instances where regarded as a contributary or associated condition.			Total incidence.		
	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.
A. Hereditary (excluding cousins, nephew, nieces and offspring)—																											
(1) Insane	...	...	...	...	...	...	...	...	...	1	1	2	2	...	2	3	1	4	...	...	...	1	...	1	1	...	1
(2) Epileptic																											
(3) Neurotic [including only hysteria, neurasthenia, spasmodic (idiopathic) asthma and chorea]																											
(4) Eccentricity																											
(5) Alcoholism																											
B. Mental Instability, as revealed by—																											
(1) Moral deficiency																											
(2) Congenital mental defects not amounting to imbecility ...																											
(3) Eccentricity																											
C. Deprivation of Special Sense—																											
(1) Smell or taste																											
(2) Hearing																											
(3) Sight																											
D. Critical Periods—																											
(1) Puberty and adolescence ...	...	...	...	...	...	...	...	...	...	4	2	6	1	...	1	5	2	7	1	...	1	...	...	...	1	...	1
(2) Climacteric	...	...	...	...	...	...	...	...	...	9	8	17	4	...	4	13	8	21	2	...	2	5	3	8	7	3	10
(3) Senility	...	...	...	...	...	...	...	...	...	5	...	5	2	1	3	7	1	8	1	...	1	...	...	...	1	...	1
E. Child-bearing—																											
(1) Pregnancy	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	1	1
(2) Puerperal state (not septic) ...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	..	1	1	...	1	1	...	...	...	...	1	1
(3) Lactation																											
F. Mental Stress—																											
(1) Sudden																											
(2) Prolonged	...	...	...	...	...	...	...	...	...	2	1	3	9	2	11	11	3	14	...	...	...	...	...	...	...	...	...
G. Physiological Defects and Errors—																											
(1) Malnutrition in early life (signs of rickets, etc.) ...																											
(2) Privation or starvation ...																											
(3) Over-exertion (physical) ...																											
(4) Masturbation																											
(5) Sexual excess																											
H. Toxic—																											
(1) Alcohol	...	...	...	...	...	...	...	...	...	16	4	20	14	7	21	30	11	41	10	...	10	1	...	1	11	...	11
(2) Drug habit (morphia, cocaine, etc.)	...	...	...	...	...	...	...	...	...	1	...	1	1	...	1	2	...	2	...	...	...	...	...	...	...	...	..
(3) Lead and other such poisons																											
(4) Tuberculosis																											
(5) Influenza																											

(6) Puerperal sepsis	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	1	...	...	...	...	...	...	...	...	...
(7) Other specific fevers																											
(8) Syphilis, acquired	...	...	...	...	...	...	...	...	...	52	11	63	10	3	13	62	14	76	13	11	24	4	...	4	17	11	28
(9) Syphilis, congenital	...	...	...	...	...	...	...	...	...	...	...	...	1	1	2	1	1	2	...	1	1	...	...	...	...	1	1
(10) Other toxins, malaria ...	...	...	...	...	...	...	...	...	...	3	1	4	8	2	10	11	3	14	1	...	1	3	...	3	4	...	4
I. Traumatic—																											
(1) Injuries																											
(2) Operations																											
(3) Sunstroke																											
J. Disease of Nervous System—																											
(1) Lesions of brain																											
(2) Lesions of spinal cord and nerves	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	1	1	...	1	1	...	1	2	...	2
(3) Epilepsy	...	...	...	...	...	...	...	...	...	2	1	3	...	...	...	2	1	3	1	...	1	...	...	...	1	...	1
(4) Other defined neurosis (limited to hysteria, neurasthenia, spasmodic asthma and chorea)																											
(5) Other neurosis which occurred in infancy or childhood limited to convulsions and night terrors	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...
K. Other Bodily Affections—																											
(1) Haemopoietic system (anaemia, etc.)	...	...	...	...	...	...	...	...	...	...	...	...	25	12	37	25	12	37	...	...	...	4	4	8	4	4	8
(2) Cardiovascular degeneration	...	...	...	...	...	...	...	...	..	...	...	...	54	4	58	54	4	58	...	...	...	17	2	19	17	2	19
(3) Valvular heart disease ...																											
(4) Respiratory system (excluding tuberculosis) ...																											
(5) Gastro-intestinal system ...	...	...	...	...	...	...	...	...	...	...	...	...	67	25	92	67	25	92	...	...	...	11	6	17	11	6	17
(6) Renal and vesical system ...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	2	...	2	...	...	...	...	...	...	...	...	...
(7) Generative system (excluding syphilis)																											
(8) Other general affections not including above (e.g., diabetes, myxoedema, etc.) ...	...																										
L. Cases in which no principal factor could with certainty be assigned but in which one or more factors were ascertained and were returned as contributary	...	...	...							76	25	101							12	2	14						
M. None assignable, notwithstanding full history and observation	2	...	2							10	...	10							8	...	8						
N. None ascertained, history defective ...	2	2	4							78	10	88							26	5	31						
	4	2	6	Total congenital cases ... ... } 6						260	64	324	Total first attack cases ... ... } 324						76	20	96	Total not first attack cases ... ... } 96					

AETIOLOGICAL, SHOWING THE AETIOLOGICAL FACTORS AND ASSOCIATED CONDITIONS ASCERTAINED IN THE DIRECT ADMISSIONS DURING THE YEAR 1928, DISTINGUISHED BETWEEN CASES CONGENITAL, FIRST ATTACK, NOT FIRST ATTACK AND UNKNOWN WHETHER FIRST ATTACK OR NOT—(*cont.*).

Aetiological factors and associated conditions.	(5) Cases unknown whether first attack or not.									(6) Total direct admissions.						Grand total incidence.		
	Principal.			Contributary.			Total incidence.			Principal.			Contributary.					
	Instances where regarded as the essential or chief factor.			Instances where regarded as a contributary or associated condition.						Instances where regarded as the essential or chief factor.			Instances where regarded as a contributary or associated condition.					
	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.
A. Hereditary (excluding cousins, nephew, nieces and offspring)—																		
(1) Insane	1	...	1	1	...	1	2	...	2	2	1	3	4	...	4	6	1	7
(2) Epileptic																		
(3) Neurotic [including only hysteria, neurasthenia, spasmodic (idiopathic) asthma and chorea]																		
(4) Eccentricity																		
(5) Alcoholism																		
B. Mental Instability, as revealed by—																		
(1) Moral deficiency																		
(2) Congenital mental defects not amounting to imbecility																		
(3) Eccentricity																		
C. Deprivation of Special Sense—																		
(1) Smell or taste																		
(2) Hearing																		
(3) Sight																		
D. Critical Periods—																		
(1) Puberty and adolescence	4	6	10	3	...	3	7	6	13	9	8	17	4	...	4	13	8	21
(2) Climacteric	14	3	17	11	1	12	25	4	29	25	11	36	20	4	24	45	15	60
(3) Senility	11	8	19	6	...	6	17	8	25	17	8	25	8	1	9	25	9	34
E. Child-bearing—																		
(1) Pregnancy	...	...	...	...	1	1	...	1	1	...	...	...	...	2	2	...	2	2
(2) Puerperal state (not septic)	...	1	1	...	1	1	...	2	2	...	2	2	...	2	2	...	4	4
(3) Lactation																		
F. Mental Stress—																		
(1) Sudden	...	...	...	1	2	3	1	2	3	...	...	...	1	2	3	1	2	3
(2) Prolonged	1	...	1	2	2	4	3	2	5	3	1	4	11	4	15	14	5	19
G. Physiological Defects and Errors—																		
(1) Malnutrition in early life (signs of rickets, etc.)																		
(2) Privation or starvation																		
(3) Over-exertion (physical)																		
(4) Masturbation																		
(5) Sexual excess...																		
H. Toxic—																		
(1) Alcohol	24	3	27	8	3	11	32	6	38	50	7	57	23	10	33	73	17	90
(2) Drug habit (morphia, cocaine, etc.) ...	...	...	...	1	...	1	1	...	1	1	...	1	2	...	2	3	...	3
(3) Lead and other such poisons																		
(4) Tuberculosis																		
(5) Influenza																		

(6) Puerperal sepsis	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	1
(7) Other specific fevers																		
(8) Syphilis, acquired	64	27	91	11	3	14	75	30	105	129	49	178	25	6	31	154	55	209
(9) Syphilis, congenital	5	...	5	1	...	1	6	...	6	5	1	6	2	1	3	7	2	9
(10) Other toxins, malaria	14	4	18	19	5	24	33	9	42	18	5	23	30	7	37	48	12	60
I. Traumatic—																		
(1) Injuries																		
(2) Operations																		
(3) Sunstroke																		
J. Disease of Nervous System—																		
(1) Lesions of brain																		
(2) Lesions of spinal cord and nerves ...	2	...	2	...	...	...	2	...	2	3	...	3	2	...	2	5	...	5
(3) Epilepsy	1	1	2	...	...	...	1	1	2	4	2	6	...	...	...	4	2	6
(4) Other defined neurosis (limited to hysteria, neurasthenia, spasmodic asthma and chorea																		
(5) Other neurosis which occurred in infancy or childhood limited to convulsions and night terrors	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	1	...	1
K. Other Bodily Affections—																		
(1) Haemopoietic system (anaemia, etc.) ...	...	...	...	22	17	39	22	17	39	...	...	...	51	33	84	51	33	84
(2) Cardiovascular degeneration	...	...	...	74	14	88	74	14	88	...	...	...	145	20	165	145	20	165
(3) Valvular heart disease																		
(4) Respiratory system (excluding tuberculosis)																		
(5) Gastro-intestinal system	...	...	...	72	22	94	72	22	94	...	...	...	150	53	203	150	53	203
(6) Renal and vesical system	...	...	...	1	1	2	1	1	2	...	...	...	3	1	4	3	1	4
(7) Generative system (excluding syphilis) ...																		
(8) Other general affections not including above (e.g., diabetes, myxoedema, etc.)...																		
L. Cases in which no principal factor could with certainty be assigned but in which one or more factors were ascertained and were returned as contributary	67	20	87							155	47	202						
M. None assignable, notwithstanding full history and observation	9	2	11							29	2	31						
N. None ascertained, history defective	103	34	137							209	51	260						
	320	109	429	Total cases unknown whether first attack or not 429						660	195	855	Total direct admissions ... 855					

APPENDIX H.

ANNUAL REPORT OF THE SPECIALIST, VENEREAL DISEASES, FOR THE YEAR 1928.

During the year under review, considerable progress has been made in the campaign against venereal disease in the Federated Malay States.

1. The numbers of new patients seeking treatment show a marked increase throughout the four States, 27.00 per cent. over 1927.

2. Education and propaganda work by means of lectures and exhibitions have also been increased.

3. Specially trained nurses have been provided at the large clinics outside Kuala Lumpur, with a view to gaining more general confidence in women patients.

4. A much needed clinic has been established at Taiping.

5. Twenty dressers from out-stations, including five Malays, have received practical instruction in venereal disease diagnosis and treatment at the Special Wards in the District Hospital, Kuala Lumpur.

The policy of previous years of combining treatment of venereal disease with that of general disease has been maintained.

The following table shows the nationality, diseases and numbers treated throughout the Federated Malay States for the years 1927 and 1928.

Nationality.	1927.				1928.			
	Total No.	Syphilis.	Gonorrhoea.	Soft sore.	Total No.	Syphilis.	Gonorrhoea.	Soft sore.
Chinese	14,797	9,662	4,180	955	19,556	13,446	4,978	1,132
Tamils	6,931	3,838	2,364	729	9,526	5,134	3,480	912
Malays	2,122	1,433	610	79	3,343	1,914	1,279	150
Sikhs	1,017	657	286	74	1,472	845	487	140
Eurasians	136	50	82	4	197	60	126	11
Europeans	304	52	229	23	457	81	327	49
Others	437	248	166	23	825	455	308	62
Total	25,744	15,940	7,917	1,887	35,366	21,935	10,985	2,456

The importance of these figures does not lie in their totals but in the fact that they represent a further realisation by all nationalities of the value of treatment and of the facilities of obtaining it.

The increased attendance of Malays is encouraging.

During the year 47,972 injections of arsenical compounds were given, together with 35,327 injections of bismuth.

The following table shows the numbers treated in each State during the years 1927 and 1928.

State.	1927.	1928.
Perak	8,400	11,262
Selangor	12,682	15,046
Negri Sembilan	3,910	7,587
Pahang	752	1,471
Total	25,744	35,366

The most noticeable advance is shown in the Negri Sembilan attendance figures.

The Pahang figures give promise of rapid progress.

Graph 1 represents the numbers treated in each State since the commencement of this department's work.

Table A shows the numbers treated by each clinic, hospital and dispensary throughout the Federated Malay States.

A report on the Anti-Venereal Disease Work falls, naturally, under two headings:
(A) Propaganda and Education.
(B) Treatment.

PROPAGANDA.

1. *Lantern Lectures.*— I have delivered the following 25 lectures, with magic lantern slides, as shewn below:

Date.	Place.	Attendance.	Hour.
	PERAK.		
3-7-28	Recreation Club, Tanjong Malim	40	7 p.m.
4-7-28	Court-house, Telok Anson	180	8 ,,
19-11-28	Court-house, Batu Gajah	200	8 ,,
20-11-28	Kuala Kangsar Club	150	8 ,,
21-11-28	Court-house, Sitiawan	80	8 ,,
22-11-28	Parit Buntar Club	80	8 ,,
23-11-28	Court-house, Taiping	60	7.30 ,,
	SELANGOR.		
20-3-28	Club, Kuala Selangor	80	7 ,,
25-7-28	Malayan Co-operative Society, Kuala Lumpur	60	7 ,,
27-8-28	Recreation Club, Kuala Kubu	70	7 ,,
31-8-28	Asiatic Club, Kajang	50	7 ,,
22-9-28	Chung Ngar Club, Kuala Lumpur	35	8.30 ,,
11-10-28	Recreation Club, Port Swettenham	90	8 ,,
26-11-28	Tamil Physical Culture Club, Kuala Lumpur	45	8 ,,
26-9-28	Victoria Institution Old Boys' Association, Kuala Lumpur	70	8 ,,
	NEGRI SEMBILAN.		
26-7-28	English School, Jelebu	180	7 ,,
15-10-28	Malay Club, Rembau	50	7 ,,
16-10-28	Chinese Miners' Hall, Seremban	70	8 ,,
18-10-28	School House, Tampin	40	7 ,,
7-11-28	Chinese Club, Mantin	200	7 ,,
8-11-28	Railway Institute, Gemas	60	7 ,,
	PAHANG.		
11-9-28	Recreation Club, Kuala Lipis	160	7 ,,
12-9-28	Anglo Chinese School, Raub	40	7 ,,
10-12-28	Jerantut	100	7 ,,
11-12-28	Subordinates' Club, Kuantan	80	7 ,,

I am quite certain of the value of these lectures.

People are interested in the subject as affecting their own health and that of their families and are anxious to know of the facilities for treatment and of the great prospect for cure.

But they are often unaware of the later sequelae of venereal disease, particularly syphilis and of the need of further treatment after the immediate lesions have disappeared.

Their interest is shewn by the questions asked after the lecture and by the increased attendances at the local centres.

Four points are always stressed:

1. The advantage and necessity of early treatment.
2. The uselessness of patent medicines, etc.
3. The advantage of the Wassermann Reaction "Blood Test" before marriage.
4. The great prospect of cure.

About forty locally-made slides are in use, showing the early and late stages of both diseases.

It is hoped that a "Before and After Treatment" series will be shortly completed.

These lectures are mainly given to English-speaking Asiatics and their influence over subordinates is always sought.

In some instances, I have lectured via an interpreter, in Chinese or Tamil and in two instances in both.

The non-English-speaking population is reached through a Committee for Public Health Education lecturer, Mr. Arshowe, who has proved himself a very efficient and popular lecturer. He has given over 50 lectures, with magic lantern slides, to various clubs and associations throughout the country.

Great help has been received from the District Officers who have always arranged and advertised these lectures and in many cases, presided.

2. *Malayan Agri-Horticultural Exhibitions.*—Advantage was taken of the three exhibitions at Telok Anson, Ipoh and Taiping for further anti-venereal disease propaganda.

At each, sufficient space was partitioned off to establish a venereal disease section. This was strikingly plastered with posters from the British Social Hygiene and other societies. A large scale map showed the many treatment centres throughout the country.

Inside were photographs illustrating the course of treated and untreated venereal disease.

Several thousand pamphlets, in five languages, were distributed and a dresser of the venereal disease staff was always on duty to explain matters.

It was not possible to count the visitors at these exhibitions, but a continual stream of all nationalities passed through the section.

3. *Posters and Pamphlets.*—Posters in English, Malay, Chinese, Tamil and Urdu are shewn at all Government hospitals and dispensaries and pamphlets are given away.

4. *Lectures to Assistant Surgeons and Dressers.*—Twenty-eight instructional lectures have been given by me at these centres.

Perak—
  Taiping
  Ipoh
Selangor—
  Kuala Lumpur

Negri Sembilan—
  Seremban
  Tampin
  Kuala Pilah

Pahang—
  Kuala Lipis
  Raub
  Bentong

5. The importance of propaganda is impressed on the staff of all clinics and much good work has been done by getting infected patients to bring the husband, or the wife, and children, up for examination.

The various Infant Welfare Centres have greatly helped in these cases.

Treatment Facilities.—There are now fifty-nine Treatment Centres in the Federated Malay States.

These may be classified thus.

(A) *The Venereal Disease Clinics* at Kuala Lumpur, Ipoh, Seremban and Taiping where the bulk of the work is treatment of venereal disease, combined with general medicine.

At each of these clinics there is a specially trained Assistant Surgeon, dresser and nurse, together with attendants, amahs, etc.

At the Klang Clinic is a trained dresser and nurse.

(B) *The Hospitals.*—Where in-door and out-door treatment is available.

(C) *The Dispensaries.*—These provide routine irrigation treatment and are visited weekly by a Medical Officer or Assistant Surgeon for injection treatment, etc.

More than half of the dressers in charge have been specially trained in venereal disease diagnosis and treatment.

SELANGOR.

Centres of Main Treatment.

Table "A" shows the numbers and diseases by the various hospitals, clinics and dispensaries in the State.

1. *The Venereal Disease Clinic and Town Dispensary, Sultan Street, Kuala Lumpur.*—The premises consist of two adjoining shop-houses which have been rented since 1924.

The accommodation is barely sufficient for the numbers attending. Waiting rooms are particularly wanted.

The following table shows the nationality, diseases and numbers treated during the years 1927 and 1928.

Nationality.	1927.				1928.			
	Total No.	Syphilis.	Gonorrhoea.	Soft sore.	Total No.	Syphilis.	Gonorrhoea.	Soft sore.
Chinese ...	3,637	1,638	2,593	111	4,170	1,565	2,404	201
Tamils ...	744	339	352	53	919	379	432	108
Malays ...	240	167	66	7	228	114	101	13
Sikhs ...	209	116	85	8	254	125	96	33
Eurasians ...	68	25	43	—	76	21	48	7
Europeans ...	181	18	153	10	291	45	210	36
Others ...	105	65	32	8	99	43	48	8
Total ...	5,184	2,368	3,324	197	6,037	2,292	3,339	406

Of the 1928 total, 2,541 were females.

The most noticeable increase is amongst the Europeans.

Three hundred and fifty-three persons attended for prophylactic treatment as compared with 248 in 1927.

It is for this purpose mainly that the Clinic is kept open from 8 a.m. to 10 a.m. on all holidays and Sundays.

The routine examinations of prostitutes under observation have, this year, been excluded from the above totals. They were 705 and 1,729, respectively.

2. A careful record has been kept throughout the year amongst the male patients to show the relation between the influence of alcohol at the time of exposure, and the incidence of venereal disease.

Nationality.	Total infected.	Under alcohol.
Chinese	1,857	19 per cent.
Tamils ...	802	44 ,,
Malays	179	12 ,,
Sikhs ...	244	34 ,,
Europeans	289	55 ,,

3. The following table shows the source of infection of the various nationalities.

Nationality.	Chinese licensed.	Chinese Sly *.	Tamils.	Malays.	Siamese.	Eurasians.	Japanese.	Sikhs.
Chinese ...	1,044	711	1	22	4	—	5	—
Tamils ...	—	110	387	150	31	3	55	—
Malays ...	—	11	5	104	4	—	5	—
Sikhs ...	—	66	10	95	2	—	—	20
Eurasians...	—	18	2	21	5	2	10	—
Europeans	—	47	32	103	34	6	15	—

* Women who do not depend solely on prostitution for a living.

4. Record of work, male section.

Irrigation	11,238
Sounds ...	913
Prostatic massage	910
Stabilarsan intravenous injections ...	3,490
Bismostab intra-mascular injections	3,480
Urethroscope examination ...	111
Wassermanns ...	809
Slide examination, male and female	5,519

Female Section, Sultan Street Clinic.—During the year 2,541 female patients were treated.

Comparative figures are—

1927 ... 2,065 Cases treated and 705 under observation examination.
1928 ... 2,541 Cases treated and 1,729 under observation examination.

Of the total treated, 1928—

Nationality.	Syphilis.	Gonorrhoea.	Total.
Chinese	441	1,871	2,313
Tamils	79	38	117
Malays	38	13	51
Sikhs	7	3	10
Eurasians	4	5	9
Europeans	1	1	2
Others	18	21	39
Total	588	1,953	2,541

Record of work—

Irrigations	6,530
Arsenical intravenous injections	1,174
Bismuth intramuscular injections	1,160
Wassermanns	292
Examination of prostitutes	3,384
Prostitutes treated	1,653

The rise in the numbers treated is chiefly amongst the Chinese and to a lesser degree amongst the Tamils. The attendance of Malay women shows a fall.

I attribute this to the fact that during the whole of 1928 the services of a Lady Medical Officer were only available for six weeks as compared with four months in 1927.

In each year the attendance figures have shown a substantial rise or fall corresponding with the presence or absence of a Lady Medical Officer. The better class female patient, the Malay in particular, will only come when she can be seen by a doctor of her own sex. Thirty-nine Malay women were treated at the Malay hospital by the Lady Medical Officer.

There has been an increased attendance of Chinese prostitutes, not only from Kuala Lumpur, but from the out-lying stations, Sungei Besi, Ampang, Kepong, Rasa, Rawang, etc.

They all come freely and recognize more and more the importance of full treatment.

The sister and the nurse give instruction in general hygiene as well as in venereal disease.

Ante-Natal Venereal Disease Treatment—Thirty-three women as compared with 26 in 1927 came for treatment and the department is in close touch with the Infant Welfare Centre.

Thirty-two children under ten years of age received treatment for venereal disease.

Staff, Sultan Street Clinic—

Venereal Disease Specialist	Dr. E. R. C. Cooke (Acting)
Assistant Surgeon	Mr. W. S. Poulier
Sister	Miss R. E. Yeomans
Nurse	Mrs. V. M. de Lile
Dresser	A. Sinnappoo
Dispenser	Koh Boo Keen
Laboratory Assistant	Low Pak Foon
One amah	
Two attendants.	

The whole staff has worked well.

Mr. D. Arunasalampillay is responsible for the preparation of the accompanying graphs.

THE DISTRICT HOSPITAL, KUALA LUMPUR, V.D. TREATMENT CENTRE.

During the year, 1,537 patients of both sexes received treatment (outdoor and indoor).

The following table shows the distribution.

Nationality.	Syphilis.	Gonorrhoea.	Soft sore.	Total.
Chinese	364	110	5	479
Tamils	467	282	27	776
Malays	79	73	—	152
Sikhs	29	24	—	53
Eurasians	13	17	—	30
Others	28	19	—	47
Total	980	525	32	1,537

The Malay figures show an appreciable rise.

The following table shows the in-door and out-door attendance for the last three years.

	1926.		1927.		1928	
	Males.	Females.	Males.	Females.	Males.	Females.
Indoor	936	120	946	105	977	172
Outdoor	226	132	274	38	326	62
Total	1,162	252	1,220	143	1,303	234

Two forty-bed wards are available for in-door treatment including accommodation for ten second class patients.

Record of work—

Irrigations	7,677
Arsenical injections	2,829
Bismostab injections	2,564
Wassermann reaction	1,339

INCIDENCE AND TREATMENT OF VENEREAL DISEASE COMPLICATION.

Buboes.—Two hundred and twenty-four cases were treated during the year. One hundred and fifty-four were hard and 70 soft. Of the 154 hard buboes, 80 subsided on painting with pure ichthyol. The treatment of soft buboes has been mainly by small incision and drainage rather than by aspiration, as so many of the latter later break down.

Gonococcal Arthritis.—Forty cases were treated. Very satisfactory results were obtained by general treatment and contramine.—In three old standing cases, *Protein Shock,* i.e., administration of 2 c.c. sterile milk into the buttocks, was used. All three patients reacted well. Average temperature 103 but followed by improvement in the pain and rigidity. Three such injections were given in each case and this treatment, combined with contramine, gave striking results in two cases, all pain having ceased and mobility of joints being regained to near normal. The third patient was improved to a lesser degree.

Epididymitis.—Forty-four cases were treated. Sulpharsenol was mainly used and has proved effective.

Balanitis Gangrenosa.—Two cases were admitted, both with syphilis. Treatment by removal of gangrenous part, dressing with hydrogen peroxide and specific therapy, both recovered.

Noma Pudenda.—(Spirochaetal Gangrene). One case was received—a Tamil girl. Patient was extremely ill with general toxaemia. The whole valva had sloughed and part of the vagina. A smear showed spirochaetes and fusiform bacilli. Treatment given was as for balanitis gangrenosa. Recovery.

Arsenical Dermatitis.—Seven cases occurred, two being Chinese and five Tamils. All patients recovered. The severity of symptoms (pruritis and oedema) was more marked in the Tamil patients. Twenty-one cases occurred in 1927. The lowered incidence rate is probably due to an improvement in the preparation of the arsenical drug used, Stabilarsan. Average time of onset = after 6th injection. Oedema and pruritis were present in all cases, while four had slight stomatitis. All cases were treated with either Ametox (May and Baker) or Theostab (Boots) together with sulphur preparation, 15 grs. t.d.s. Thyroid extract was also given. Calamine powder was used for the pruritis. Nova-Surol was used in two cases as a diuretic, with immediate good effect. A sample of the same batch number of Stabilarsan used was sent to the I.M.R. for analysis but in no instance was undue toxicity found.

Encephalitis Haemorrhagica (Serous Apoplexy).—Three cases occurred during the year, two patients being Tamils and one a Chinese. The symptoms were recognised at once but in spite of immediate treatment all three died.

The Aetiology.—Appears uncertain. Ehrlich considered it due to the toxic action of an oxidisation product of Salvarsan while McDonagh regards it as Syphilitic lesion *per se*. All writers stress the alcohol factor. I present the clinical symptoms and P.M. findings fairly fully as they are of general interest owing to the rarity and heavy mortality of the disease.

Case 1.—Tamil (24) admitted with primary sore. C.S.F. and blood gave a weak positive W.R. Given two injections of .3 gram Stabilarsan. Five days after the second injection complained of giddiness and unsteady gait. Next day excited in manner. Reflexes + +, pupils dilated, temperature 103°, relapsed into coma with epileptiform seizures. These increased in frequency to half hourly before death. Died on sixth day from onset of symptoms.

Post-mortem—

Brain.—Cerebral and meningeal vessels engorged. Cerebellum Oedoematous.
Liver.—Slight cloudy swelling.
Kidneys.—Cloudy swelling and engorgement. No arsenic found in renal tissue.

Case 2.—Tamil (30). Primary sore. W.R. +. Received two injections of .3 gram Stabilarsan. Seven days after last injection became excited in manner. Reflexes + +, pupils dilated. Became comatose but with no fits. Spasticity of upper and lower limbs. Death on second day from onset of symptoms.

Post-mortem—

Brain.—Acute congestion—slight haemorrhage.
Heart and Lungs.—Petechial haemorrhages.
Kidneys.—Acute congestion.
Liver and Spleen.—Friable and congested.

Case 3.—Chinese (37) mining coolie. Primary sore and phimosis. C.S.F. and blood W.R. Negative. Four injections of .3 gram Stabilarsan, three days after last, some drowsiness. Had a fall from bed. Acute congestion of conjunctivae, reflexes normal but pupils dilated. No fits. Died next day.

Post-mortem—

Brain.—Congested and oedoematous.
Lungs.—Sub-pleural petechiae.
Kidneys.—Acute congestion.
Liver.—Minute haemorrhages.
Spleen.—27½ ounces. Very congested.

I am indebted to Dr. P. H. Martin, Pathologist, Institute for Medical Research, for his very complete notes on the P.M. findings—from which I have made these summaries.

Treatment.—Treatment was started with the onset of early symptoms.

Lumbar Puncture and withdrawal of 20 to 25 c.c. of the cerebro-spinal fluid relieved the immediate symptom but had to be repeated at daily intervals. The C.S.F. was always clear but under pressure. It was replaced by 1 c.c. of .1 in 1,000 *adrenalin chloride* in saline, intra-thecally. Adrenaline was also given four hourly intramuscularly. *Theostab* (.45 gram) was injected in all cases.

Points of interest are—

1. The doses given were low .3 gram Stabilarsan.
2. The patients were of good general condition, average weight 110 pounds, haemoglobin index 80 per cent. and malaria parasites absent.
3. One batch number used, No. 174, was common to two cases but was reported on by the Institute for Medical Research, after M.R.C. Tests as "No undue toxicity found".

   This batch number had been used on 40 to 50 patients the same day, without ill effects.
4. The W. R. was positive in one case—both blood and C.S.F. Positive, blood only in another, and negative in the third.
5. In none of the cases was there evidence of alcoholism.

   In his text book on venereal diseases, David Lees, F.R.C.S., writes "In our experience there is no known method of prophylaxis and it is impossible to tell in which case it will develop."

TREATMENT OF VENEREAL DISEASES.

A.—GONORRHOEA.

The essential treatment has been by irrigation with potassium permanganate (1 in 5,000) or mercury oxycyanide (1 in 4,000). Lunargen and neo-silvol have been used with varying success in obstinate cases.

AS ADJUVANTS.

1. *Vaccines.*—Four preparations have been used, two British and two American. It can only be said that results have been generally disappointing with a few brilliant exceptions.

2. Two preparations S.U.M. 36 and S.U.P. 36 were tried in acute and chronic gonorrhoea but were later discarded.

3. Neutral Acriflavine (Boots) has been much used (500 cases). It is given intravenously in a dose of 10 c.c. of a 2 per cent. solution, bi-weekly. It is indicated in early acute cases where it at once lessens the discharge, relieves pain and helps towards an early cure. It also has a definite value in cases of fistula. In other chronic conditions its effect is not noticeable.

A transitory sensation in the throat and burning of the skin is generally noticed by patients but these symptoms pass off in 2 to 3 minutes.

B.—TREATMENT OF SYPHILIS.

Stabilarsan and N.A.B. are the two main arsenical preparations in use for intravenous treatment.

Sulpharsenol or Sulphostab are employed when intramuscular treatment is indicated. They have been largely used in the treatment of congenital syphilis.

Tryparsamide has given very satisfactory results in the treatment of neurosyphilis.

Bismuth (as Bismostab) has entirely replaced mercury and is always given in conjunction with the arsenical preparation.

Course of treatment.—The course of treatment as now given at the Sultan Street Clinic is an initial dose of .3 gram Stabilarsan and .5 c.c. Bismostab. This is followed at weekly intervals, by nine injections of .6 gram Stabilarsan and 1 c.c. Bismostab, totalling 5.7 gram Stabilarsan and 9.5 c.c. Bismostab. The Wassermann Reaction is then taken. If positive, a second similar course is given, without intermission, together with potassium iodide. If negative, treatment is stopped for one month (except for iodide) and then a second similar course is given. The Wassermann Test is again taken and a third further course advised after three or six months, depending on the reaction. Nearly all Europeans and many Asiatics realize the necessity for full treatment and are aware of the significance of the W.R. "Blood test".

But in the treatment of the majority, the immediate success of a few injections is a serious handicap to the eradication of the disease.

With the disappearance of their immediate symptoms, such patients consider themselves cured, and further treatment unnecessary. Their average attendance is five or six times. Much persuasion is used to these patients and the future danger pointed out. It is hoped to raise their average attendance during 1929. It was thought that the routine doses previously given (.3 gram Stabilarsan and ½ c.c. Bismostab), were too small considering the freedom from undue toxicity of these preparations—and in particular was there need for more vigorous early treatment of that class of patient to whom a few injections meant a cure. With this in view, two series of patients were taken as tests. Both series received an initial dose of .3 gram Stabilarsan and ½ c.c. Bismostab.

Series 1.—Patients of good physique and condition, i.e., mining coolies at Sungei Besi, these were given a second and subsequent doses of .9 Stabilarsan and 1 c.c. Bismostab.

Series 2.—Patients of average physique, etc., these were given second and subsequent doses of .6 Stabilarsan and 1 c.c. Bismostab.

In neither series were there any ill effects, immediate or remote, nor any complaints from the patients and further experience has confirmed this.

As a result, on a basis of six attendances, patients now receive, in the one instance 4.8 gram Stabilarsan and 5.5 c.c. Bismostab, and in the other, 3.3 gram Stabilarsan and 5.5 c.c. Bismostab.

These larger doses, at least in the early and tractable stages of the disease, must have an increased spirillocidal action.

A further series of tests, as to the relative effect of these arsenical doses on the W. R. is in progress.

3. *Federal Home for Women and Children, Kuala Lumpur.*—The Federal Home has been visited weekly for the treatment of inmates with venereal disease. Thirty-seven such cases were found. More than half had a double infection of syphilis and gonorrhoea. Making allowance for this fact there were 16 cases of syphilis and 25 cases of gonorrhoea.

RECORD OF WORK.

Arsenical injections	104
Bismuth injections	96
Wassermann	46
Examination of slides	285

4. *Klang Treatment Centre.*—During the year 2,142 patients were treated, an increase of 700. In June, 1928, a specially trained Chinese nurse was sent to Klang. Her utility is shown by the female figures for the first and second half year, 69 and 164, respectively.

The following table shows the nationalities and diseases treated during 1927 and 1928.

Nationality.	1927.					1928.			
	Total No.	Syphilis.	Gonorrhoea.	Soft sore.		Total No.	Syphilis.	Gonorrhoea.	Soft sore.
Chinese	650	489	138	23	...	987	678	277	32
Tamils	567	334	199	34	...	857	477	312	68
Malays	78	31	42	5	...	126	59	65	2
Sikhs	47	19	23	5	...	101	50	46	5
Europeans ...	2	—	2	—	...	1	—	1	—
Others	56	17	38	1	...	70	31	35	4
Total ...	1,400	890	442	68	...	2,142	1,295	736	111

The increased attendance of Malays is encouraging.

PERAK.

Table "A" shows the numbers and diseases treated at the various hospitals and clinics throughout the State.

The following table shows the nationalities and diseases treated in the State during the years 1927 and 1928.

Nationality.	1927.					1928.			
	Total No.	Syphilis.	Gonorrhoea.	Soft sore.		Total No.	Syphilis.	Gonorrhoea.	Soft sore.
Chinese	4,886	3,657	669	560	...	6,507	5,080	942	485
Tamils	2,347	1,342	682	323	...	3,063	1,686	1,070	307
Malays	744	558	155	31	...	881	608	228	45
Sikhs	336	212	82	42	...	567	334	182	51
Eurasians	16	6	9	1	...	21	10	9	2
Europeans	14	8	6	—	...	24	7	17	—
Others	77	47	25	5	...	199	123	66	10
Total ...	8,420	5,830	1,628	962	...	11,262	7,848	2,514	900

Attendance of patients has noticeably increased at Tanjong Malim, Batu Gajah and Parit Buntar.

An outstanding feature is the very successful work done at the *Female Malay Hospital, Kuala Kangsar.* Comparative figures for 1927 and 1928 are 199 and 484, respectively.

This success, at Kuala Kangsar in particular, amongst Malay women, is a very hopeful sign.

Dr. (Mrs.) Chitty was in charge of the hospital and clinic from July, 1927, till the latter part of 1928.

The Venereal Disease Clinic, Ipoh.—This clinic is combined with a dispensary. There is good accommodation for males and females. As it was only opened in July, 1927, comparative figures are not available.

Nationality.	Total No.	Syphilis.	Gonorrhoea.	Soft sore.
Chinese	2,362	1,763	513	86
Tamils	425	249	145	31
Malays	124	94	25	5
Sikhs	349	203	133	13
Eurasians	8	5	2	1
Europeans	10	5	5	—
Others	96	57	36	3
Total	3,374	2,376	859	139

After training at the Sultan Street Clinic, a Chinese nurse was sent to the Ipoh Clinic in July, 1928. As a result the attendance of females for the second half year is more than double that of the first half year.

The Venereal Disease Clinic, Taiping.—This clinic is in Main Street and adjoins the Infant Welfare Centre and Dispensary. Towards the end of the year structural alterations were made to provide separate entrances for the two classes of patients, venereal and non-venereal and to provide for complete separation of the sexes.

In June, 1928, the dispensary treatment facilities were reorganised on the basis of a clinic, with an Assistant Surgeon (Mr. F. M. Koland) and Chinese nurse in attendance. Both had previously received special training at the Sultan Street Clinic.

The following table shows the nationalities and diseases treated.

Nationality.	Total No.	Syphilis.	Gonorrhoea.	Soft sore.
Chinese	471	372	73	26
Tamils	240	106	109	25
Malays	62	32	24	6
Sikhs	15	6	7	2
Eurasians	10	4	5	1
Europeans	6	1	5	—
Others	17	8	8	1
Total	821	529	231	61

NEGRI SEMBILAN.

Table "A" shows the numbers and diseases treated at the various clinics, hospitals and dispensaries throughout the State.

The following table shows the nationality and disease treated during 1927 and 1928.

Nationality.	1927.				1928.			
	Total No.	Syphilis.	Gonorrhoea.	Soft sore.	Total No.	Syphilis.	Gonorrhoea.	Soft sore.
Chinese	1,944	1,461	381	102	3,151	2,176	770	205
Tamils	1,108	595	428	85	2,388	1,233	910	245
Malays	509	307	189	13	1,442	728	669	45
Sikhs	135	94	34	7	192	86	79	27
Eurasians	34	16	16	2	53	10	42	1
Europeans	88	25	57	6	113	22	83	8
Others	92	51	36	5	258	114	112	32
Total	3,910	2,549	1,141	220	7,587	4,369	2,665	553

The increased Malay attendance is noticeable.

All treatment clinics show progress, Tampin and Jelebu especially. The Malay dresser at Rembau has done good work and propaganda amongst his own race.

With change of personnel at Gemas more satisfactory attendance of Federated Malay States Railway Staff has been obtained.

Seremban Clinic.—This clinic is suitably situated and has excellent accommodation for both male and female patients.

The following table shows the nationality and the diseases treated during the years 1927 and 1928.

Nationality.	1927.				1928.			
	Total No.	Syphilis.	Gonorrhoea.	Soft sore.	Total No.	Syphilis.	Gonorrhoea.	Soft sore.
Chinese	716	479	176	61	1,002	528	395	79
Tamils	348	154	159	35	561	187	308	66
Malays	115	45	65	5	524	185	375	15
Sikhs	52	27	18	7	162	82	57	23
Eurasians	27	13	13	1	49	10	38	1
Europeans	73	23	46	4	79	20	51	8
Others	43	18	22	3	123	50	58	15
Total	1,374	759	499	116	2,501	1,062	1,282	207

Of the 1928 total, 1,007 patients were women.

PAHANG.

Table "A" shows the numbers and diseases treated in the various hospitals and dispensaries throughout the State.

The following table shows the nationalities and the diseases treated during 1927 and 1928.

Nationality.	1927.				1928.			
	Total No.	Syphilis.	Gonorrhoea.	Soft sore.	Total No.	Syphilis.	Gonorrhoea.	Soft sore.
Chinese	388	304	55	29	842	692	115	35
Tamils	192	105	54	33	323	181	111	31
Malays	92	33	57	2	168	80	85	3
Sikhs	38	29	6	3	85	66	15	4
Eurasians	1	—	1	—	1	—	1	—
Europeans	10	—	5	5	10	5	3	2
Others	30	23	5	2	42	32	8	2
Total	751	494	183	74	1,471	1,056	338	77

Owing to the scattered population, Kuala Lipis, Raub, Bentong and Kuantan are responsible for 80 per cent. of this total.

STAFF CHANGES.

Mr. G. H. Oorloff, Assistant Surgeon, resigned from the service on 4th March, 1928.

Dr. E. A. Smith, who was the first officer appointed as Specialist, Venereal Diseases, Federated Malay States, went on three months' leave prior to retirement on 1st June, 1928.

The writer was appointed to act as Specialist, Venereal Diseases, on 1st June, 1928, after several months' training under Dr. Smith and has continued to do so.

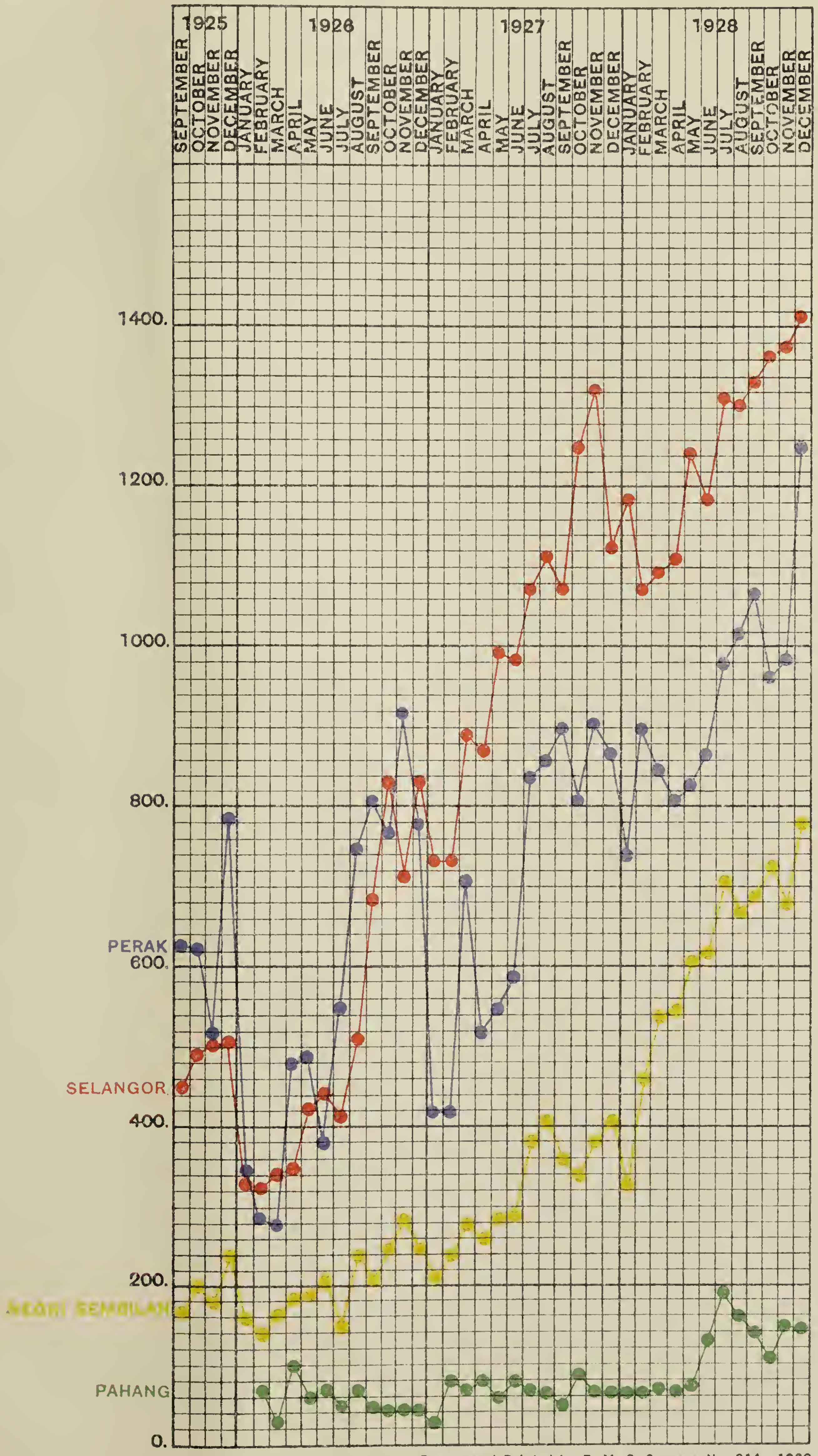
I have to thank all Senior Medical Officers for much help and co-operation.

E. R. C. COOKE,
Acting Specialist, Venereal Diseases, F.M.S.

FEDERATED MALAY STATES

VENEREAL DISEASE

GRAPH SHOWING NUMBERS TREATED FROM SEPTEMBER 1925



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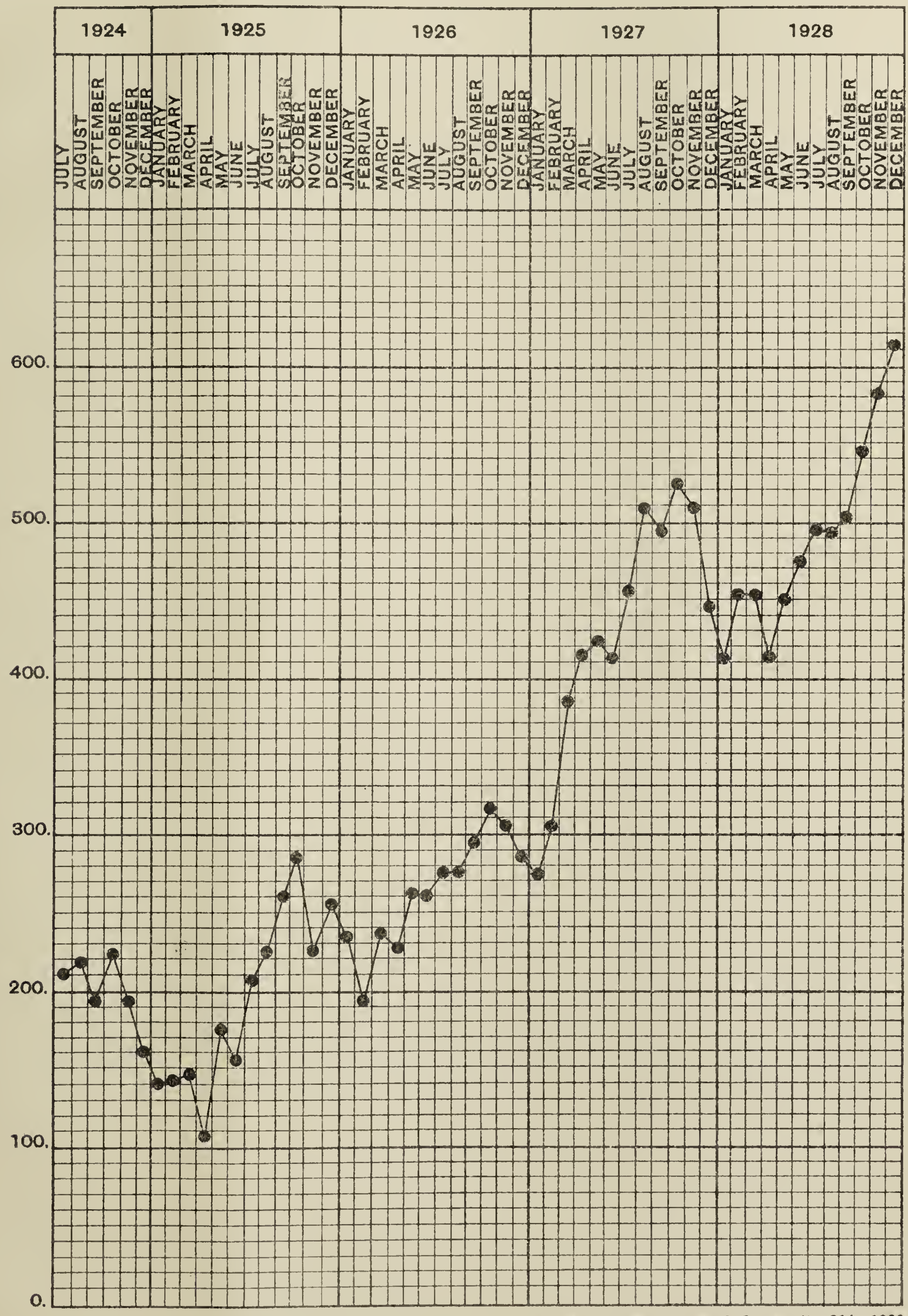
SULTAN STREET VENEREAL DISEASE TREATMENT CENTRE
KUALA LUMPUR
GRAPH SHOWING ADMISSIONS FROM JULY 1924 TO DECEMBER 1928



Drawn and Printed by F. M. S. Surveys No. 314 - 1929

TAIPING VENEREAL DISEASE TREATMENT CENTRE

1928

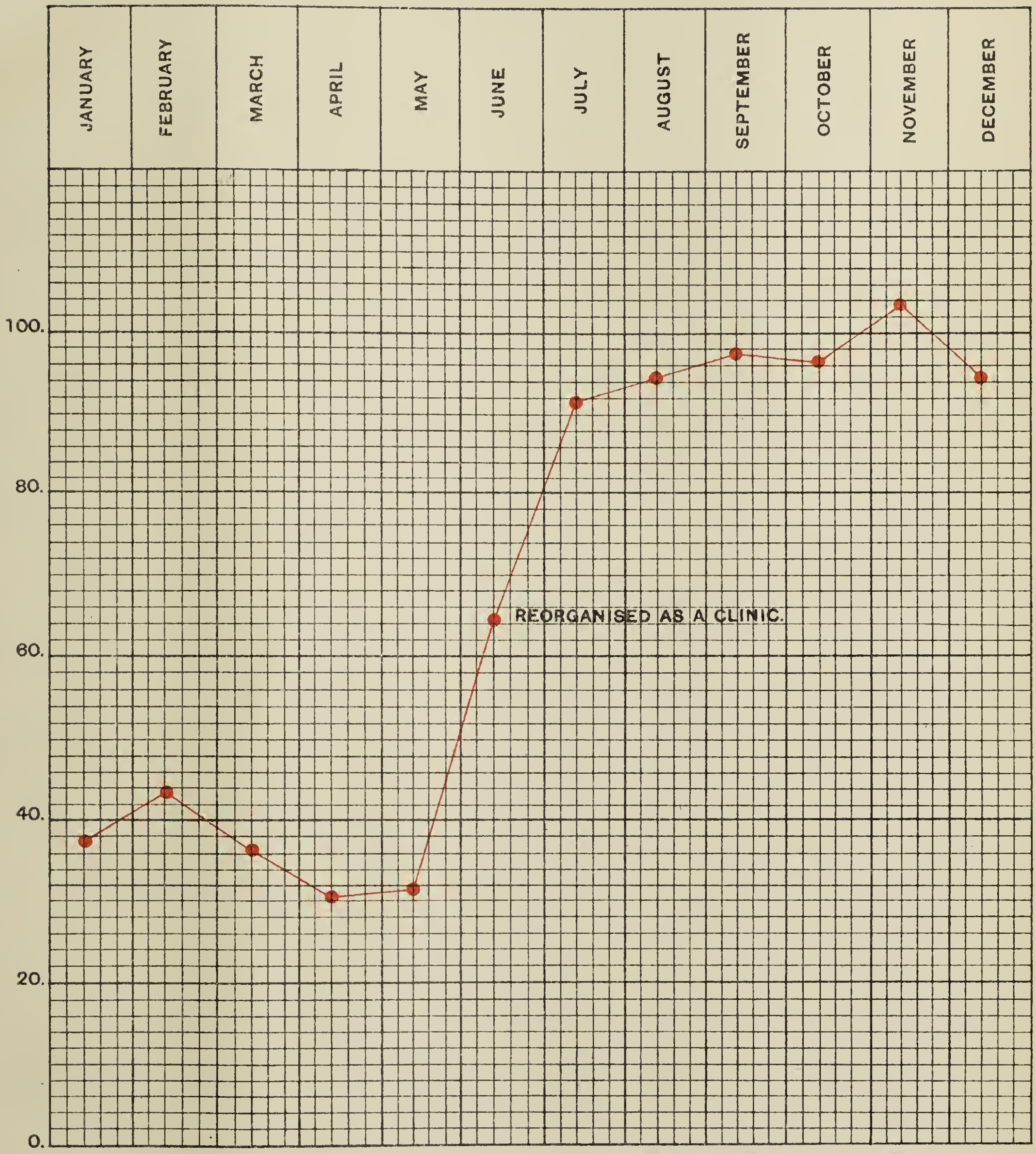


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Table "A."

PERAK.

V.D. Centre.	Disease.	Yearly total.
Ipoh Clinic	Syphilis	2,376
	Gonorrhoea	859
	Soft Sore	139
Ipoh Hospital	Syphilis	362
	Gonorrhoea	155
	Soft Sore	76
Taiping Clinic	Syphilis	529
	Gonorrhoea	231
	Soft Sore	61
Taiping Hospital	Syphilis	234
	Gonorrhoea	131
	Soft Sore	56
K. Kangsar Women Hospital	Syphilis	137
	Gonorrhoea	347
	Soft Sore	—
K. Kangsar Hospital	Syphilis	331
	Gonorrhoea	146
	Soft Sore	80
B. Gajah Clinic	Syphilis	291
	Gonorrhoea	62
	Soft Sore	94
B. Gajah Hospital	Syphilis	357
	Gonorrhoea	102
	Soft Sore	37
Kampar	Syphilis	392
	Gonorrhœa	103
	Soft Sore	143
Telok Anson	Syphilis	576
	Gonorrhoea	103
	Soft Sore	36
Lenggong	Syphilis	15
	Gonorrhoea	5
	Soft Sore	10
Selama	Syphilis	—
	Gonorrhoea	1
	Soft Sore	5
Sitiawan	Syphilis	25
	Gonorrhoea	11
	Soft Sore	6
Parit	Syphilis	42
	Gonorrhoea	5
	Soft Sore	1
Kroh	Syphilis	95
	Gonorrhoea	—
	Soft Sore	—
Tanjong Malim	Syphilis	267
	Gonorrhoea	44
	Soft Sore	42

PERAK—(*cont.*).

V.D. Centre.	Disease.	Yearly total.
Sungkai	Syphilis	84
	Gonorrhoea	11
	Soft Sore	9
Tapah	Syphilis	370
	Gonorrhoea	11
	Soft Sore	6
Parit Buntar	Syphilis	714
	Gonorrhoea	194
	Soft Sore	22
Gopeng	Syphilis	85
	Gonorrhoea	30
	Soft Sore	67
Bagan Datoh	Syphilis	24
	Gonorrhoea	12
	Soft Sore	—
Grik	Syphilis	214
	Gonorrhoea	3
	Soft Sore	7
K. Intan	Syphilis	34
	Gonorrhoea	3
	Soft Sore	—
K. Kurau	Syphilis	120
	Gonorrhoea	4
	Soft Sore	3
Tg. Rambutan Central Mental Hospital	Syphilis	248
	Gonorrhoea	21
	Soft Sore	—
Bagan Serai	Syphilis	166
	Gonorrhoea	30
	Soft Sore	10

SELANGOR.

V.D. Centre.	Disease.	Yearly total.
District Hospital, K. Lumpur	Syphilis	980
	Gonorrhoea	525
	Soft Sore	52
Sultan Street Clinic, K. Lumpur	Syphilis	2,292
	Gonorrhoea	3,339
	Soft Sore	406
Klang Clinic	Syphilis	1,295
	Gonorrhoea	736
	Soft Sore	111
Klang Hospital	Syphilis	111
	Gonorrhoea	97
	Soft Sore	94
Kajang	Syphilis	626
	Gonorrhoea	113
	Soft Sore	24
Kuala Selangor	Syphilis	56
	Gonorrhoea	14
	Soft Sore	3

SELANGOR—(*cont.*).

V.D. Centre.	Disease.	Yearly total.
Kuala Kubu	Syphilis	788
	Gonorrhoea	212
	Soft Sore	149
Serendah	Syphilis	494
	Gonorrhoea	96
	Soft Sore	3
Port Swettenham	Syphilis	58
	Gonorrhoea	92
	Soft Sore	34
Rawang	Syphilis	260
	Gonorrhoea	67
	Soft Sore	11
Rasa	Syphilis	375
	Gonorrhoea	77
	Soft Sore	8
Sapintas	Syphilis	8
	Gonorrhoea	14
	Soft Sore	1
Sungei Besi	Syphilis	966
	Gonorrhoea	78
	Soft Sore	43
Sepang	Syphilis	147
	Gonorrhoea	67
	Soft Sore	80
Telok Datoh	Syphilis	314
	Gonorrhoea	38
	Soft Sore	7
Federal Home	Syphilis	25
	Gonorrhoea	16
	Soft Sore	1

NEGRI SEMBILAN.

V.D. Centre.	Disease.	Yearly total.
Seremban Clinic	Syphilis	1,062
	Gonorrhoea	1,282
	Soft Sore	207
Seremban Hospital	Syphilis	199
	Gonorrhoea	143
	Soft Sore	41
Mantin	Syphilis	92
	Gonorrrhoea	125
	Soft Sore	25
Kuala Pilah Women Hospital	Syphilis	121
	Gonorrhoea	46
	Soft Sore	—
Kuala Pilah District Hospital	Syphilis	911
	Gonorrhoea	336
	Soft Sore	101
Tampin	Syphilis	947
	Gonorrhoea	385
	Soft Sore	63

NEGRI SEMBILAN—(*cont.*)

V.D. Centre.	Disease.	Yearly total.
Rembau	Syphilis	61
	Gonorrhoea	73
	Soft Sore	8
Jelebu Clinic	Syphilis	188
	Gonorrhoea	135
	Soft Sore	42
Jelebu Hospital	Syphilis	60
	Gonorrhoea	14
	Soft Sore	3
Port Dickson	Syphilis	452
	Gonorrhoea	111
	Soft Sore	56
Gemas	Syphilis	326
	Gonorrhoea	16
	Soft Sore	7

PAHANG.

Kuala Lipis	Syphilis	308
	Gonorrhoea	81
	Soft Sore	27
Mentakab	Syphilis	303
	Gonorrhoea	5
	Soft Sore	3
Kuantan	Syphilis	114
	Gonorrhoea	144
	Soft Sore	28
Bentong	Syphilis	161
	Gonorrhoea	17
	Soft Sore	7
Raub	Syphilis	163
	Gonorrhoea	37
	Soft Sore	9
Pekan	Syphilis	6
	Gonorrhoea	55
	Soft Sore	1

Appendix I.

ANNUAL REPORT OF OPHTHALMOLOGIST SURGEON, IPOH, FOR THE YEAR 1928.

OUT-DOOR.

	New cases.	Repetitions.	Total.
A. *Diseases.*—			
Conjunctivitis	1,799	4,046	5,845
Gonorrhoeal ophthalmia	31	43	74
Lids	95	110	205
Trachoma	306	3,191	3,497
Pterygium	34	7	41
Keratitis	142	167	309
Ulcer cornea	184	322	506
Iritis	54	138	192
Cataract	129	172	301
Glaucoma	18	57	75
Retinitis	35	32	67
Ocular muscles	9	2	11
Lacrymal apparatus	17	150	167
B. *Injuries.*—			
Lids	24	18	42
Conjunctiva	36	11	47
Cornea	82	187	269
Iris	1	—	1
Lens	2	2	4
Ruptured eyeball	1	—	1
C. *Refraction.*—			
Myopia	61	51	112
Myp. astigmatism	27	6	33
Hypermetropia	22	14	36
Hyp. astigmatism	16	—	16
Presbyopia	76	1	77
Asthenopia	53	11	64
Night blindness	4	—	4
Amblyopia	3	2	5
Diplopia	1	7	8
D. *General.*—			
Facial erysipelas	4	—	4
Facial paralysis	10	11	21
Frontal neuralgia	9	1	10
Cerebral tumor	1	—	1
Keratomalacia	5	9	14
Exoph. goitre	1	4	5
Secondary anaemia	1	2	3
E. *Disorganised eyes.*—			
One	69	27	96
Both	6	3	9
Total	3,368	8,804	12,172

Nationality.—	New cases.	Repetitions.	Total.
Chinese	2,407	7,467	9,874
Indians	613	1,025	1,638
Malays	148	191	339
Europeans	173	74	247
Eurasians	27	47	74
Total	3,368	8,804	12,172

Sex.—	New cases.	Repetitions.	Total.
Males	2,663	6,011	8,674
Females	705	2,793	3,498
Total	3,368	8,804	12,172

IN-DOOR.

	Admissions.
A. *Diseases.*—	
Conjunctivitis	89
Gonorrhoeal ophthalmia	31
Lids	7
Trachoma	63
Pterygium	5
Keratitis	55
Ulcer cornea	67
Iritis	24
Cataract	67
Glaucoma	17
Retinitis	16
Ocular muscles	2
Lacrymal apparatus	3
B. *Injuries.*—	
Lids	6
Conjunctiva	6
Cornea	22
Iris	2
Lens	2
Ruptured eyeballs	2
C. *General.*—	
Night blindness	1
Facial ery-sipelas	4
Keratomalacia	9
Cerebral tumor	1
Sixth nerve paralysis	1
D. *Disorganised eyes.*—	
One	19
Both	1
Total	522

Nationality.—	
Chinese	335
Indians	161
Malays	22
Eurasians	4
Total	522

Sex.—	
Males	407
Females	115
Total	522

OPERATIONS.

MAJOR.

	No.
Extraction of cataract	68
Ex. disscision and washing out capsule	1
Iridectomy	31
Trephining	9
Iridotomy	2
Enucleation of eyeball	4
Total	115

MINOR.

Dissection of pterygium	4
Prolapsed iris snipped off	6
Removal of foreign body cornea	36
Needling (after cataract)	15
Paracentesis for hypopion ulcer	4
Expression of lids	17
Removal of Conj. growth	1
Dilatation of canaliculus	42
Incision abscess lid	1
Removal growth lid	3
Plastic operation for entropion of lid	2
Total	131

Major	115
Minor	131
Total	246

RESULT OF CATARACT OPERATIONS.

Good	51
Fair	9
Diseased retina	2
Intra occular haemorrhage	1
Iritis	2
Panophthalmitis	4
Total	69

GONORRHOEAL OPHTHALMIA.

Condition of cornea on admission.—

Cornea clear	12
Ulcer cornea	12
Eye disorganised	7
Total	31

Of the 12 "cornea clear" one developed ulcer cornea during treatment.

P. H. HENNESSY,
Medical Officer and Ophthalmic Surgeon, F.M.S.

APPENDIX J.

ANNUAL REPORT OF THE DEPUTY MEDICAL OFFICER IN CHARGE OF OPHTHALMIC CLINIC, KUALA LUMPUR, FOR THE YEAR 1928.

Sir,—I have the honour to submit my annual report of the Ophthalmic Department, Kuala Lumpur, for the year ending 31st December, 1928.

The total number of patients treated was 4,445, of these 1,041 were in-patients, and 3,404 were out-patients.

The classification of patients according to nationalities was as follows:

	In-door.	Out-door.	Total.
Chinese	488	770	1,258
Tamil	327	925	1,252
North Indians	70	518	588
Malays	123	923	1,046
Eurasians	12	123	135
Europeans	2	125	127
Others	19	18	37
Total	1,041	3,402	4,443

The number of patients attending this department shows a steady increase since this department was organised.

Year.	No. of patients treated.
1925	1,917
1926	2,962
1927	4,178
1928	4,443

The prevailing diseases of the eye both external and internal, errors of refraction, and the operations performed, are shown under appropriate headings in a list appended herewith. Of the external diseases of the eyes, the following were most prevalent.

1. *Catarrhal Ophthalmia.*—This disease was found to occur in epidemic form in waves at certain seasons of the year, simultaneously with, or immediately following, an outbreak of Influenza. The organism present in the smear was not unlike Pfeiffer's bacillus. In severe cases K.W. Dipplococci predominated. The latter, when neglected and become chronic, seems to cause changes in the conjunctival fornices very similar to those seen in early cases of Trachoma.

2. *Trachoma* is seen to be most prevalent amongst the poorer classes of the Chinese and the North Indians. The illustrated pamphlet on this subject written by the writer and published by the Public Health Education Committee since 1925 has had to be reprinted in several thousands for distribution to the public.

3. *Ulcer of Cornea.*—This affection, which is preventable, adds to the number of the blind and the inefficient amongst the community. Hypopyon Ulcer is in many cases the sequel of what at first may have appeared as a slight abrasion of the cornea. Several cases are referred to us or seek treatment after irreparable damage to eye-sight has been done.

Kerato-Malacia, a food deficiency disease to which I have called attention before, was met with in increasing numbers. Ulcer of cornea is particularly severe amongst the ill-fed and poor people living amongst insanitary surroundings. Preventive measures to deal with these factors that effect the people adversely would minimise misery and suffering.

4. *Cataract.*—The number of persons seeking relief for this affection shows a steady increase from year to year, giving one the impression that the incidence of this disease is rising. There is no doubt that glare is a contributary factor in the aetiology of this disease.

Refraction and Retinoscopy.—The public made increasing use of this branch of our work. Several European and other educated people of the community availed themselves of our assistance in this direction. A large number of school children were examined and fitted with glasses for various defects in their vision.

Myopia is unfortunately prevalent, particularly amongst the Chinese. The unfortunate prejudice against children wearing spectacles amongst the Asiatics has helped to accentuate the defect, with detriment to the acuteness of vision of the individual concerned. The minds of the people should be disabused of this erroneous idea that children would grow out of the defects as they grow older.

Of the internal diseases of the eye, affections of the optic nerve and retina were seen in several cases—venereal diseases, tobacco, alcohol, diabetes, etc., were mostly the exciting causes.

Optic atrophy, both primary and secondary, is seen to occur fairly frequently.

Glaucoma accounts for a fair number of the blind. The insidious onset of the disease often leads to neglect, with the result that these unfortunate people are seen too late to be saved from blindness.

Operations.—The total number of ophthalmic operations were 437. Of these, 194 were major and 243 were minor. We are happy to have had only one case of sepsis amongst our operations for Cataract. This is a very gratifying result, and speaks much for the efficiency of our aseptic measures. Many a poor patient who was operated on for Cataract was fitted with spectacles supplied by the Government and enabled to earn his livelihood.

Amongst other operations there were several cases of interest, but one of them is worthy of special record. It was a case of Rodent Ulcer very successfully treated by operation.

Amongst other cases of interest I must record the occurrence of thrombosis of the cavernous sinus in three patients—all Chinese; all proved fatal. These were correctly diagnosed, and the diagnosis of one case was confirmed by post-mortem examination. The other two cases were refused post-mortem examination. Two were adults, one had mastoid and internal ear troubles before the sinus was involved. The other had Otitis Media and showed no evidence of sinus trouble except paresis of the external Rectus muscle. However the diagnosis of sinus thrombosis was made and later confirmed at the post-mortem examination. The third was a child who had a phlegmonous abscess in the neck developing sinus thrombosis later.

General.—Special ophthalmic charts for out-patients and in-patients were drafted by us and approved by the Government after consulting the Ophthalmologist, Federated Malay States. These are now in use and should help to obtain valuable information in time to come.

Suggestions for certain improvements and alterations in the Clinic have been submitted and these when effected should offer additional facilities for our work. We have hopes of obtaining additional equipment and instruments during the next year. This would enhance the efficiency of our work and help this branch of the Medical Department to become of increasing benefit to the public.

I have the honour to be,
Sir,
Your obedient servant,
A. VISWALINGAM,
Deputy Medical Officer in Charge,
Ophthalmic Department,
Kuala Lumpur.

THE OPHTHALMIC CLINIC, GENERAL HOSPITAL,
Kuala Lumpur, *28th January, 1929.*

OPHTHALMIC OPERATIONS.

MAJOR OPERATIONS.

Radical operation for entropion (partial tarsectomy)	15
Operation for ectropion	3
Operation for symblepharon	1
Blenorrhaphy	1
Transplantation and excission of pterygiun	22
Flap (conjunctival) operation	4
Paracentesis of anterior chamber	7
Iridectomy (optical)	19
Iridectomy and trephining for glaucoma	6
Removal and discission of cataract	77
Evisceration of eyeball	11
Enucleation of eyeball	12
Removal of tumors of eye, sarcoma, etc.	2
Ablation of staphyloma cornea and iris	6
Dacryocystectomy	8
Total ...	194

MINOR OPERATIONS.

Stye abscess	62
Meibomian abscess	35
Cyst (sebaceous) removal	7
Removal of foreign body from conjunctiva	35
Peritomy for pannus	6
Foreign body from cornea	60
Sub-conjunctival injections	28
Tatooing of cornea	2
Electro-cautery for hernia, iris and ulcer cornea	10
Meibomian cyst—opening and scraping	8
Total	253

DISEASES OF THE FUNDUS.

Vitreous opacity	2
Retinitis	47
Neuro-retinitis	18
Subacute neuritis	4
Optic neuritis	7
Toxic neuritis	2
Retino choroiditis	11
Choroiditis	5
Papilitis	1
Optic atrophy	16
Opacity of lens	13
Glaucoma	27
Total	153

RETINOSCOPY AND REFRACTION.

Emmetropia	1,819
Asthenopia	10
Astigmatism	19
Myopia	371
Hypermetropia	17
Hyperopic astigmatism	25
Presbyopia	79
Aphakia	9
Myopic astigmatism	32
Compound astigmatism	3
Total	2,384

Notes on the case of rodent ulcer referred to above :

Name	New Choon
Age	50 years
Race and sex	Chinese, male
Duration of illness	18 months

Clinical nature of lesion.—Ulcer on the left cheek involving the outer canthus of the orbit and the outer third of both lids $1\frac{1}{2}''$ long and $1''$ wide—elliptical in shape, base tough, edges indurated, irregular, elevated and of a dark blue colour.

Pathological Report.—"Sections show tumour to be a rodent ulcer."

Operation.—Complete excision of growth.

Result.—Healing by first intention. Photographs show condition before and after treatment.

APPENDIX K.

ANNUAL REPORT OF THE RADIOLOGIST, FEDERATED MALAY STATES, FOR THE YEAR 1928.

Dr. C. F. Constant, Radiologist, Federated Malay States, proceeded on long leave on May 4th. Dr. F. G. Greenwood, Radiologist, Ipoh, acted as Radiologist, Federated Malay States, until the end of the year and Dr. J. J. O'Grady, Medical Officer, Seremban, acted as Radiologist, Ipoh. Mrs. E. S. G. Johnston was appointed Lady Assistant for Electro-Therapeutics to the department on February.

BUILDINGS.

In Kuala Lumpur the building in Circular Road is adequate, but the X-Ray Department will of course be incorporated in the new buildings of the General Hospital when this is built. Space has been provided on the draft plans for this.

In Ipoh the work has outgrown the present building, which was in any case not suitable. A sum of $18,000 has been approved in the 1929 budget for a new building and plans are now being made for this.

By the end of 1929 the buildings and equipment at Ipoh and Kuala Lumpur should be almost identical.

EQUIPMENT.

The electric refrigeration mentioned in the 1927 report has been in use throughout the year and has proved very satisfactory both at Kuala Lumpur and Ipoh.

The "Serial Fluorographic" outfit at Kuala Lumpur has been very efficient, and one of these units is to be installed at Ipoh in 1929, as also is ultra-violet light apparatus.

EXAMINATIONS AND TREATMENTS.

X-Ray cases ... ... Kuala Lumpur, 1,545; Ipoh, 820; Seremban, 600.
Treatments ... ... Kuala Lumpur, 1,919; Ipoh, 187; Seremban, 63.
Total X-Ray cases 2,965 ... Treatments 1,269.

Several cases of suspected gall bladder disease have been examined during the year by Dr. Graham's method. This consists of giving Sodium Tetraiodo-phenolphthalein, a dye which is secreted into the gall bladder. So far it has been given by the mouth in all cases. This has not proved altogether satisfactory, as the preparation of the patient and the administration of the drug is rather tedious, and the value of an examination showing an unfilled gall-bladder, i.e., a diseased gall-bladder, is always under suspicion owing to the possibility that the capsules have not disentegrated at the correct time. This is a disadvantage in temperate climates and much more so here, where all capsules are liable to change if kept. A supply of the drug for intravenous injection has now been obtained and trials will be made with this, which should be more satisfactory.

A trial was made for the first time of the injection of lipiodol for the demonstration of the bronchial tree. The injection is made through the crico-thyroid membrane after anaesthetising the tracheal mucous membrane. This operation was performed by Dr. McKenna and the examination was of considerable use in the case in which it was tried.

During the year there were two very interesting cases of spontaneous pneumothorax. In one of the patients the condition developed while he was confined to bed in hospital and was to all intents and purposes symptomless. The greater part of the lower lobe of the lung on the affected side was held in place by pleural adhesious and this averted the shift of the mediastinum, which is apparently the factor causing the acute and dramatic onset not infrequently seen in these cases.

One case of "Singapore ear" was treated by ultra-violet light. The patient had suffered from this for very many years, having contracted it originally as "Khartoum ear". Four treatments with the water-cooled lamp were given, without quartz local applicators and a commencing attack was aborted. After the third treatment the opposite ear became painful and this was also treated in the same manner, and responded excellently. The patient at the time of writing has been without symptoms for about 10 weeks, which is a longer period than he has enjoyed for many years. Dr. Ashby has been getting very good results for this condition with Zinc Ionisation. This method is possibly more painful but the equipment required is simpler. With careful selection of cases very good results should be obtained.

As regards ultra-violet light it is interesting to note that even in deeply pigmented Tamils a response to treatment can be obtained in superficial tuberculous conditions and some skin disorders. The initial tolerance appears to be about ten times that of the European.

OFFICE OF RADIOLOGIST, F.M.S., KUALA LUMPUR,
January 3rd, 1929.

C. F. CONSTANT,
Radiologist, F.M.S.

X-RAY ANNUAL REPORT, SEREMBAN, FOR THE YEAR 1928.

Dr. O'Grady did the X-Ray work from the beginning of the year until the middle of April, when he went on transfer to act as Second Radiologist, Federated Malay States, Ipoh.

For the remainder of the year the work has been done by the First Medical Officer, Seremban, in addition to his other duties. The Radiological work done has shown a very big increase. Whereas in 1927 the total number of examinations was 110, in 1928 this increased to 600.

The increase is most notable in the second half-year:

First half-year	187 examinations
Second half-year	413 ,,

During the last four months the number of examinations per month has averaged well over 70.

These increased figures are due to several causes, the chief one being that this year an attempt has been made to give Negri Sembilan the efficient Radiological service it needs, and that instead of odd cases being done by the Chief Surgeon in his spare time the work is now carried out by the First Medical Officer, Seremban, on lines similar to Selangor and Perak.

Other causes are the wider knowledge of usefulness of Radiological examination, the stationing of Medical Officers at Tampin and Kuala Pilah, and the general large increase of work.

Cases are seen from all hospitals of the State and the Infant Welfare Centre.

A pleasing feature of the work is the co-operation that is possible between the Chief Surgeon and Radiologist. As the X-Ray set is in the hospital the former is often able to be present at the screening of the patients which is especially useful in fracture work.

If necessary, patients can be anaesthetised on the X-Ray table and their fractures manipulated and an immediate view of them seen; a most desirable state of affairs, which saves the bother and discomfort of repeatedly moving patients from hospital to X-Ray room for further examinations after manipulation.

A stereoscope has been constructed from old splints and soap boxes, which although not a thing of beauty gives excellent results and is especially useful for locating foreign bodies in the tissues. With all the increased work (and this state of affairs is likely to be permanent) one finds that the X-Ray set here is not all that can be desired, it not being especially suitable for the Tropics, and at times it is a danger to the operator and itself. Short circuits are frequent, and as the apparatus works on unrectified high tension current the X-Ray tube is submitted to danger of puncture, and repairs to punctured tubes are an expensive item. It is to be hoped that in the early future Negri Sembilan will be provided with an installation equal to that of Ipoh, as the amount of work here now appears to justify it, and it would be an economy in the long run.

A Potter Bucky draphragm is needed in order that more extensive work can be carried out, and this is being asked for.

The need of a portable X-Ray set in places where there is a European Hospital like Seremban has been well brought out this year.

Twenty-eight cases of accidents (mostly motor mishaps) on Europeans have been examined by X-Ray this year. As things are at present these patients have to be transported to the X-Ray room at the General Hospital and placed on a table that is too short.

The shifting of the patient and the getting of him on this table are usually most painful proceedings and at times not without danger to life.

Three cases in the latter category have had to be dealt with, one of them having six broken ribs plus a fracture of the tibia and fibula. The examination in this case was extremely necessary, but extremely dangerous under these conditions.

With a portable set such an examination is simple; the set is taken to the bedside and connected up to the ordinary electric supply, and the necessary work done without shifting the patient.

A dark room is needed as an extension from the present X-Ray room, as the existing one is some distance away and delays the work. It is hoped that this will be remedied in the near future. Certain other electrical work has been carried out by means of the Pantostat, the chief of which has been Ionization.

This on picked cases has given excellent results. Among cases dealt with successfully have been chronic ulcers, tropical (Singapore) ear, septic sinuses, fistula in ano, ischiorectal ulcers, acute gonorrhoea, sciatica.

There is a large sphere for this kind of work in native hospitals, material being abundant.

It is to be regretted that any large or systematic application of it is limited owing to the limited amount of time that is available for this special work, as in certain types of cases it appears to give quicker and better results than any other available treatments.

C. F. ASHBY,
First Medical Officer, Seremban.

X-RAY ANNUAL REPORT, IPOH, FOR THE YEAR 1928.

During 1928 the numbers of cases examined and treated were as follows:

X-Ray examination	820
Electrical treatment	187

The X-Ray apparatus is capable of working at milliamperages up to 100 (one hundred). Owing however to the high voltage drop on the main line to the X-Ray room it is not yet possible to work with a milliamperage exceeding twenty or twenty-five.

While this is adequate for the majority of cases, it is not entirely satisfactory for organs which need the shortest possible exposure to minimise the effects of respiration and movement. In Radiography of the lungs, heart, gall-bladder, and stomach, and in cases of young children who are very difficult to keep still, a high milliamperage, although not absolutely essential, is a distinct advantage.

During the month of August the cable from the power station to the X-Ray room was replaced by heavier wiring in the hope of diminishing the voltage drop. No improvement, however, has been noticeable.

ELECTRICAL TREATMENT.

The equipment available consists of a Diathermy machine, a Pantostat, and a new Vario Frequency Apparatus which had just arrived. The value of Diathermy does not seem to be realised, or perhaps it is not generally known that such treatment can be had at Ipoh. The number of cases sent was much less than one would expect in a large State such as Perak.

J. J. O'GRADY,
Radiologist, Ipoh.

Appendix L.

ANNUAL REPORT OF THE MEDICAL OFFICER IN CHARGE OF THE LEPER ASYLUM, KUALA LUMPUR.

The year now under review, while not notable for any great changes in the Settlement, has yet witnessed a steady increase in its development on the modern lines which have proved so successful in other countries.

It is proposed first to comment briefly upon the more salient factors and problems which are being dealt with, while the statistics will be given in an Appendix at the end.

EXPANSION AND IMPROVEMENTS.

The large increase in the number of inmates has necessitated the erection of many new wards. To meet this need, 14 temporary "kongsi" houses have been erected by the inmates themselves, the materials being supplied by the Public Works Department. These houses, each of which will comfortably accomodate 14 inmates, are soundly constructed and essentially suitable for the existing conditions.

Two of the permanent wards have been reroofed and repainted, while a third ward has also been repainted.

The task of draining the 17 acres of ground occupied by the Settlement is now almost completed. This work has been difficult owing to the uneven nature of the ground, and much credit is due to the leper masons who have carried it out. Another great improvement has been the supplying of water from the Kuala Lumpur town supply. Previous to this, the water had partly been obtained from shallow wells and was a constant danger. The water is now carried by pipes to every part of the Settlement and so saves a considerable amount of labour. It has also made possible the erection of bath rooms in all areas. These bath rooms, numbering ten, are each provided with a large cemented tank, and give every incentive to the maintenance of personal cleanliness which is regarded as a factor of great importance in the treatment of the inmates.

ADMISSIONS.

During the year 346 cases were admitted, an increase of 55 per cent. on the returns of last year. This steady increase in numbers is regarded as due to a better knowledge of the manifestations of leprosy on the part of the lay community, and to the increase in size of our medical service. It must not be taken as evidence that the incidence of leprosy is increasing.

The more detailed system of note-taking which has been introduced has provided the following information which is of interest:

(1) The average length of residence in Malaya previous to admission was 15.5 years. This is in opposition to the opinion commonly held that immigrants from India and China commonly enter this country while suffering from the early stages of leprosy.

(2) The average length of time between the appearance of the first signs of leprosy and the time of admission was 2.2 years.

(3) Attempts have been made to obtain good case histories but the results have been disappointing. Contrary to the findings of Muir and Rogers in India it was unusual to obtain a history of close contact with a leper. Only six of these cases gave a history of bed infections: one admitted having leper friends, but denied that he had ever slept with them: and the remainder asserted that they had never associated with lepers in any way.

(4) *Type of Infection.*—Fifty per cent. of the cases in this series were of the mixed type, 19 per cent. were of the nerve type, and 31 per cent. were cases of cutaneous leprosy.

(5) Site of the fast noticeable lesion. In 31 per cent. of these cases the site of the initial lesion was on the legs, the arms were first affected in 20 per cent., face and neck in 23 per cent., trunk in 18 per cent., arms and legs simultaneously in 3.7 per cent. and eyes in 4 per cent. of cases.

DEATHS.

The total number of deaths was 58. It is only in rare cases that the actual cause of death can be assigned to leprosy itself. Secondary infection of ulcers, resulting in gangrene, is the usual termination in the many cases who are admitted in an advanced condition. Pulmonary tuberculosis, as would be expected is another common terminal condition.

DISCHARGES.

As in previous years no cases have been discharged, the responsibility of discharging apparently cured cases is a heavy one, for once they have left the Settlement it becomes almost impossible to trace them. For this reason it is felt that a system of discharge on parole is impracticable.

Old and decrepit lepers who form the majority of the cases are best looked after in a settlement: indeed they never evince any desire to regain their liberty. If discharged, they would merely join the beggar community and again come under the care of the State. For aesthetic reasons also, their segregation is desirable.

It is believed however that the policy adopted has been unnecessarily cautious. The discharging of apparently cured cases after a suitable length of time serves a double purpose. It is an extremely important factor in the propaganda towards persuading early infectious cases voluntarily to seek admission, and it also relieves the State of the expense of maintaining these cases in an institution.

In the coming year it is hoped to utilise the Discharge Board which was set up some years ago, and to liberate the small number of inmates who can satisfy such conditions as are laid down.

TREATMENT.

A.—Specific Treatment.

1. *Tai Foong Chee.*—This form of treatment which was introduced and strongly advocated by Dr. Travers is still largely used. Seventy per cent. of the inmates take it more or less regularly and many of them firmly believe in its efficacy. The prolonged and irregular course of Hansen's disease makes it very difficult to assess the value of any drug used to combat it and this is particularly the case with Tai Foong Chee.

It probably varies considerably in the percentage of active constituents, and it is doubtful how much of it is absorbed from the alimentary canal. It is hoped to investigate this matter during the coming year. At present it is impossible to make any definite statement concerning its value.

2. E.C.C.O. Hydnocarpus estere in the form of Muir's well known E.C.C.O. mixture has been largely used during the year. In all, 3,177 injections of this were given during the year, the dose varying from 0.5 to 3.0 or 4.0 c.c. The results obtained are given below.

Results of E.C.C.O. Treatment.

No. of injections given.	No. of patients.	Much improved.	Improved.	Stationary.	Worse.
Over 40	11	7	3	1	None.
30-40	20	12	6	1	1
20-30	32	9	13	8	2
10-20	71	3	53	12	3
1-10	108	none	8	98	2
Totals	242	13%	34%	50%	3%

3. *Alepol.*—Through the kindness of the British Empire Leprosy Relief Association supplies of the preparation known as "Alepol" have been available and a number of cases have been given this treatment. The intramuscular routs is employed owing to the objections which the inmates make to intravenous medication.

For the purpose of this report it will be sufficient to tabulate the results so far obtained.

RESULTS OF ALEPOL TREATMENT.

No. of injections given.	No. of patients.	Much improved.	Improved.	Slightly improved.	Stationary.	Worse.
35-40	4	0	2	1	0	1
30-35	3	0	1	1	1	0
25-30	6	1	0	5	0	0
20-25	2	0	1	1	0	0
15-20	1	0	1	0	0	0
10-15	7	2	1	3	1	0
Under 10	8	0	0	0	8	0
Totals	31	10%	55%		32%	3%

The results so far obtained with this preparation have thus been most encouraging. It is intended to use it extensively during the coming year.

4. *Krysolgan.*—This preparation which contains gold in a complex organic molecule has been favourably reported on by several workers. Through the kindness of the manufacturers it is being given an extended trial. Apparently it has been found to be particularly valuable in clearing up the ocular manifestations of leprosy and accordingly cases of this type have been chosen for its trial. A longer period of observation and treatment will be necessary before a definite opinion on this preparation can be given. The results so far obtained have been promising.

B.—TREATMENT OF SECONDARY INFECTION.

The adequate treatment of all ulcerated surfaces so as to minimise secondary infection is regarded as one of the most important functions of a leper settlement. Every possible means is used to encourage personal cleanliness among the inmates. The many excellent bath-rooms give every encouragement to this. Hot water for dressings is always available. Posters, written in Chinese and Tamil, have been exhibited which explain the importance of these measures. All patients with extensive foul ulcers are admitted to the small hospital, where they can be regularly dressed by the attendants. Less severe cases attend the dispensary daily for dressing. It is a rule that no inmate must walk about barefooted. Old motor tyres can be made into excellent shoes for bandage-covered or deformed feet.

It has been found that many indolent ulcers are much benefitted by short exposures to the sun's rays. This natural heliotherapy has now an established place among the remedies which are used.

C.—ORTHOPEDIC TREATMENT.

Activities in this direction are at present restricted owing to the absence of facilities for performing operations. The results of other workers have shown that there is considerable field for this type of work in leprosy, and it is hoped that it may prove equally successful in this Settlement when available.

An attempt is being made to teach the principles of physio-therapy to one of the more intelligent inmates, so that massage etc., may be available for selected cases

D.—TREATMENT OF INTERCURRENT DISEASES.

Pulmonary Tuberculosis.—The routine examination on admission frequently discloses the fact that the patient has pulmonary tuberculosis in addition to his leprosy. It has now been possible to arrange for the separate segregation of all cases of active tuberculosis. Extra diet is given to these cases and a special attendant is responsible for their welfare.

Another ward has been set aside for old and decrepit inmates. Here, their food is cooked for them and a male attendant is in charge. Several cases have so improved that it has been possible to allow them after a time, to return to the ordinary wards.

Syphilis.—All cases on admission are examined for the Wassermann and Kahn reactions. Since this rule was instituted 80 sera have been examined and the results are given below. The notation is that adopted by Harrison. The technique was that known as the Medical Research Council No. 1.

Results of 80 Wassermann Reactions on Lepers :

W.R. result	+ +	12 cases
„ „	+ ±	5 „
„ „	+	7 „
„ „	±	4 „
„ „	⩲	3 „
„ „	anticomplementary	4 „
„ „	negative	45 „

The Kahn reaction agreed with these findings in all except six cases (excluding of course the three anticomplementary sera). Five of these gave a negative Kahn reaction with a one plus Wassermann reaction, the discrepancy persisting on repetition of the test. None of these five cases showed clinical signs of syphilis, and it was therefore assumed that the Kahn test was the more reliable in this instance. The sixth case gave a – Wassermann reaction and a three plus Kahn reaction. There were clinical signs of syphilis in this patient and his condition improved considerably after a course of antisyphilitic treatment. At the conclusion of this both tests gave a negative result.

E.—EPHEDRINE.

This drug which was introduced and reported upon by Dr. Richard Green in the Report for last year continues to be a most valuable remedy in the condition commonly known as the leprous reaction. The expense of the drug unfortunately limits its use to the more severe cases.

During the year 22 cases of leprous reaction have been treated with this drug, and the clinical condition and progress has been carefully recorded. From these data there can be no doubt that Ephedrine shortens the febrile period, diminishes the pain associated with this condition and to a large extent controls the allergic skin reaction which is such a marked feature of these cases.

Previous to the introduction of this drug the skin lesions in severe cases nearly always ulcerated resulting in secondary infection ultimately and a good deal of disfigurement. Happily, such cases are now rare. A paper on the value of Ephedrine in leprosy has been written by Dr. Richard Green and will shortly be published.

RESEARCH.

In addition to the investigations on the Kahn and Wassermann reactions in leprosy, reported on above, certain other investigations have been carried out at the Institute for Medical Research, Kuala Lumpur :

(i) A diagnostic procedure described by Rubino and known as the Rubino reaction has been tried on a series of cases. Briefly, the reaction depends upon the property possessed by leprous sera of causing the rapid sedimentation of a specially prepared suspension of formalinised sheeps red cells. Seventy-two sera have so far been examined by this method. A full description of the technique employed is unnecessary for the purposes of the present report. It will be sufficient to state that the reaction was positive in all the active cases of leprosy included in the series. It gave negative results in cases of long-standing nerve leprosy in whom the infection had obviously burnt itself out. In seventy-two sera obtained from non-lepers, the reaction was slightly positive in one case only. It appears therefore that this test may give assistance in the diagnosis and also in the prognosis of leprosy. When a larger series of cases has been selected it is hoped to publish the results in detail.

(ii) Certain experiments have been carried out with a view to determining to what extent the clothes etc., of lepers are instrumental in carrying the disease from one person to another. These investigations were prompted by the fact that in the past more stringent precautions have been taken to prevent the inmates from sending letters or goods of any kind to their friends outside.

Fifty slips of paper, as nearly as possible resembling the size and texture of one-dollar notes were circulated among the inmates for the period of a fortnight. These were then collected and a piece one square centimetre in area was cut from each. These small pieces were each subjected to the action of antiformin for 48 hours. At the end of this period the residue was washed, placed on a slide and stained for lepra bacilli by Ziehl Neelsen's method. In not a single case were acid fast organisms discovered.

In view of these results it was felt that the rule prohibiting letter writing was unnecessarily cautious. A system has now been introduced whereby letters written by the inmates are placed in a special box which is taken once a week to the Institute for Medical Research and there autoclaved. The letters are thereafter posted in the ordinary way. This extra safeguard though probably unnecessary makes it doubly sure that there is no possible danger in allowing the inmates to communicate with their relatives or friends.

Social Life of the Settlement.

Every effort is made to unite the inmates in an organised society. The ideal is that it should be a self-supporting society in addition. The year under review has witnessed many improvements in this direction. Space does not permit the growing of vegetables etc., sufficient for their needs, but all the available ground is under cultivation.

There are several pig-sties all well kept which are a source of profit to their owners. Chickens and ducks are welcome additions to the dietary and are again profitable. At the new settlement at Sungei Buloh it is hoped to extend all these activities. In addition it may also be possible to maintain a few cows for milking purposes.

The Settlement can boast of its own carpenters, tin-smiths, clog-makers, masons and tailors. There is a confectioner's shop and several general stores.

In the coming year, all the clothes are to be made by the women inmates from cloth provided by Government. This will provide continuous employment for a number of women, and will allow of a small profit at the same time.

In September a new club house was built for the use of the English-speaking inmates. This has already proved a big factor in their social life. Out-door games such as cricket and badminton are played, and an athletic sports meeting is held twice a year.

The maintenance of law and order is surprisingly good on the whole. Minor offences are committed from time to time but the general atmosphere is that of a quiet and well organised community.

Opium is given to those who are habituated to its use but the amount supplied is gradually reduced. In this way it is usually possible to break the habit, which undoubtedly retards improvement.

The Children.

Especial care is taken of the fifty children who are now segregated in the Settlement. If the parents themselves are not living in the Settlement a foster mother is found for each child, who thus does not lose completely the atmosphere of home life.

Early in the year a new school was built by the inmates. Here the children receive a thoroughly sound education at the hands of Mr. Yuen Zye Yew. The school life also includes physical training and organised games.

When it is time to leave school each boy and girl is made to learn a trade so that he or she may become a useful member of the community. This is of particular importance as it is hoped that, with constant improvements in the treatment of leprosy, many of them will ultimately be discharged.

Through the kindness and enthusiasm of the Scout movement in Kuala Lumpur, a Scout Troup has been raised, and promises to be a big factor in the upbringing of the boy inmates.

STAFF.

In June, Dr. Richard Green received permission to resign the position of Medical Officer in Charge, after being in charge of the Settlement for 3 years, owing to pressure of work at the Institute for Medical Research. Dr. C. Russell Amies has been appointed in his stead.

It is hoped to fill the post of Steward, now vacant, by appointing Mr. Yuen Zye Yew to this position. Several of the inmates are qualified to undertake the education of the children and the position of Schoolmaster can be easily filled.

The complete establishment of the Settlement is as follows :

Non-lepers—

Medical Officer in charge (part-time)	1
Assistant Medical Officer (,,)	1
Guards	12

Lepers—

Assistant Surgeon Grade 1	1
Steward	1
Assistant steward	1
Clerk	1
Schoolmaster	1
Ward attendants (male)	18
,, ,, (female)	2
Assistant attendants (male)	4
Toties (male)	14
,, (female)	1
Cook	1
Assistant cook	1
Dhobies	2
Barbers	2
Gardeners	8
Head sweeper	1
Sweepers	8
Lampmen	1

ANNUAL RETURNS OF ADMISSIONS ETC., FOR THE YEAR ENDING DECEMBER 31st, 1928.

	Chinese.	Indians.	Javanese.	Eurasians.	Total.
No. of inmates on 1st January, 1928	550	108	5	5	668
No. of inmates on 31st December, 1928	693	155	10	4	862
No. of admissions	251	88	6	1	346
No. of deaths	40	17	0	1	58
No. of abscondings	—	—	—	—	81
Transfer to Tanjong Rambutan	—	—	—	—	9
Discharged (diagnosis in error)	0	2	0	0	2
No. of female inmates	108	17	4	1	130
No. of E.C.C.O. injections given	—	—	—	—	3,177
No. of Alepol ,, ,,	—	—	—	—	574
Total number treated during the year	806	195	11	6	1,014

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